Environmental Assessment

Tijuana and Playas de Rosarito Potable Water and Wastewater Master Plan

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Region IX

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Section 1
General Information

1.1 Federal Action

The U.S. Environmental Protection Agency (EPA) is participating in a planning study to determine the potable water and wastewater infrastructure needs of the Tijuana-Rosarito area, in the State of Baja California, Mexico. With grant funds from EPA, the Comision Estatal de Servicios Publicos de Tijuana (CESPT) has conducted a year-long effort to develop a comprehensive and dynamic plan that defines an integrated strategy for water and wastewater services to meet the needs of present and future generations in regard to public health, quality of life and environmental protection. This effort has culminated in the release of the draft *Tijuana and Playas de Rosarito Water and Wastewater Master Plan*, which provides a long-term program of improvements to the potable water supply and wastewater treatment systems for these cities. This draft plan will be finalized once the EA process has been completed.

1.2 Environmental Assessment Process

In compliance with the National Environmental Policy Act (NEPA), EPA has prepared an Environmental Assessment (EA) in accordance with the EPA regulations set forth in 40 Code of Federal Regulations (CFR) Part 6 and the Council of Environmental Quality (CEQ) regulations at 40 CFR Parts 1500-1508. This EA analyzes the potential environmental impacts that may occur in the U.S., the transboundary impacts, from the activities proposed in the draft Master Plan. A review of potential environmental impacts in Mexico is discussed in the Mexican Environmental Assessment, *Manifestacion de Impacto Ambiental para el Plan Maestro de Agua Potable y Sanaemiento para los Municipios de Tijuana y Playas de Rosarito* (MIA for short).

As supported by the analysis presented herein, a Finding of No Significant Impact (FONSI) has been prepared. This EA and the attached FONSI will be circulated for a 30-day public review period, during which the public and interested agencies are encouraged to submit comments. EPA will consider all comments on the EA and FONSI submitted during the review period and forward them to CESPT for consideration in the final master plan.

1.3 Scope of the Environmental Assessment

The EA provides a programmatic level of evaluation for the draft Master Plan, based on the conceptual nature of the water and wastewater systems described therein. The EA addresses environmental effects that may occur within the U.S. as a result of the construction and operation of the proposed systems (i.e., transboundary effects).

As individual improvement projects proposed within the context of the Master Plan are submitted to the Border Environment Cooperation Commission (BECC) and the North American Development Bank (NADB) for certification and funding, more detailed levels of planning will be needed. At that time, if EPA participates in the construction of the proposed projects, through its Border Environment Infrastructure Fund (BEIF), additional project specific environmental assessments will be prepared.

1.4 Purpose and Need

In the last 20 years, explosive growth has occurred in the municipalities of Tijuana and Playas de Rosarito, creating significant challenges for the agency responsible for water and wastewater, Comision Estatal de Servicios Publicos de Tijuana (CESPT). The combined population of these two cities, estimated at nearly 1.4 million in 2002, is expected to continue to grow at an average annual rate of 2.9% to reach 2.4 million in 2023.

Major engineering projects like the construction of the San Antonio de los Buenos Wastewater Treatment Plant and the Rio Colorado –Tijuana aqueduct in the early 80s, and a great number of investments and infrastructure improvements in the 80s and 90s in the areas of potable water, wastewater collection, and sanitation, have been necessary to accommodate growth and promote economic prosperity in the region. However, significant challenges persist: approximately 6% of the population lack access to piped potable water; 14% of the population is not connected to the sewer system; and approximately 360 l/s of wastewater is discharged to the Pacific Ocean without treatment (except for chlorination), creating coastal impacts.

Wastewater management is particularly complex due to the pronounced topography of the area and to its proximity to the United States. The Tijuana River, which crosses the city, flows into the U.S. and discharges to the Pacific Ocean. However, although the natural drainage of most of Tijuana is into the U.S., international agreements preclude any raw wastewater from crossing the border, resulting in the need for atypical wastewater collection and conveyance infrastructure, including extensive pumping.

Without a comprehensive planning effort, the rapidly growing region would likely experience a considerable reduction in the standard of living, public health problems and environmental deterioration on both sides of the border, and regional economic impacts.

Projects derived from the master plan would be implemented to help expand the wastewater collection system, provide sufficient wastewater treatment, reduce impacts due to discharges of wastewater to transboundary waters, expand the water distribution system, provide new or augmented sources of water supply.

1.5 Location

The area of study is located in the urban zones of Tijuana and Playas de Rosarito (Rosarito). The municipality of Tijuana encompasses an area of 215,987 acres (87,407 hectares) and is located in the northwest of the state of Baja California, within the coordinates of 32° 34’ and 32° 22’ latitude north; and 116° 35’ and 117° 07’ longitude west. The municipality is bordered to the north by the United States of America, to the south by the municipality of Rosarito, to the west by the Pacific Ocean and to the east by the municipality of Tecate. The municipality of Rosarito has a surface area of 122,917 acres (49,743 hectares) and is located to the south of Tijuana, and is bordered to the south by Ensenada.

Figure 1-1 illustrates the geographic location and the topography of the area of study.

1.6 Community Description

1.6.1. Population

This section presents the population growth for border communities, in particular, recent demographic growth in Tijuana and Playas de Rosarito, as well as the age and gender structure for these communities in 2000. The information analyzed in this section is from the 2000 Mexican Population and Housing Census (Censo Mexicano de Población y Vivienda del 2000, CMPV).

Between 1940 and the mid-1970s, the Mexican population grew at a rapid pace, with annual demographic growth rates of 2.5 percent in the 1940s, 3.1 percent in the 1950s, and 3.4 percent in the 1960s. From the mid-1970s on, the Mexican population continued to grow at lower rates: an average annual rate of 3 percent in the 1970s, 2.1 percent in the 1980s, and 2 percent during the 1990s. The explanation for this pattern of demographic growth lies in high fertility levels combined with a continuously declining mortality rate.

The population growth rate has not been the same in all regions of Mexico. The phenomenon of internal migration within the country can explain regional differences in demographic growth. Besides fertility and mortality, the volume and characteristics of migratory flows within Mexico largely explains regional demographic dynamics.

Mexico’s northern border has been marked by accelerated demographic growth, greater than for the country as a whole, and comparable only to the growth experienced by Mexico’s major metropolitan areas.

Northern states in Mexico that share a border with the United States (Baja California, Sonora, Chihuahua, Coahuila, Nuevo León, and Tamaulipas) grew from 2.1 million inhabitants in 1930 to 16.6 million in 2000. These border states have grown at a faster rate than the national average in recent years.

Insert Figure 1-1

In northern Mexican states rates of growth fell during the 1980s, but those rates again increased in the 1990s.

The population of the cities that lie along the border rose from less than half a million inhabitants in 1930 to 2.35 million in 1970 and to 5.97 million in 2000. Thus, the border cities' populations grew at an accelerated rate, so that the overall population in 2000 was 20 times larger than in 1930. The rate of population growth in border cities is greater than the rate in the northern states or the national average.

The annual average demographic growth of all border cities during the 1990s was 3.6 percent, while nationally the rate was 1.7 percent. This demographic growth in the border zone is fairly heterogeneous among the cities in this area.

The greatest population growth in recent years in the northern border has occurred in the urban area of Tijuana-Rosarito. The population in this urban area grew from 65,364 residents in 1950 to 1,274,420 residents in 2000, making it the most densely populated area on the northern border. Tijuana-Rosarito grew at a higher rate than other urban border areas.

The 2000 Population and Housing Census reported that 1,274,240 residents live in this border community, of which 5 percent (63,420) reside in Rosarito with the remainder (1,210,820) residing in the city of Tijuana.

The population projections used in the Master Plan for the municipalities of Tijuana and Playas de Rosarito are presented in Table 1-1, and Table 1-2 shows the corresponding growth rates.

Table 1-1
Total Population for the Municipalities of Tijuana and Playas de Rosarito

Year	Tijuana	Playas de Rosarito
2000	1,232,062	65,123
2001	1,270,092	68,679
2003[1]	1,349,711	75,790
2008	1,560,253	95,504
2013	1,787,878	118,946
2023	2,258,517	177,815
2030[2]	2,636,594	231,577
2040[2]	3,195,576	324,957

Source: Table 5-1.
[1]The year 2003 does not represent a planning period, but merely the year in which the plan was initially implemented.
[2] The years 2030 and 2040 were projected since they represent planning periods for supply sources.

Table 1-2 Tijuana and Playas de Rosarito: Growth Rates 1990-2040		
	Tijuana	**Playas de Rosarito**
1990-1995	5.1	12.4
1995-2000	4.7	7.2
2000-2005	3.0	4.8
2005-2010	2.7	4.5
2010-2015	2.6	4.3
2015-2020	2.5	4.1
2020-2025	2.3	4.0
2025-2030	2.2	3.7
2030-2035	2.0	3.5
2035-2040	1.8	3.3
Source: master plan estimates		

1.6.2 Land Use

The purpose of this section is to analyze the structure of land use in Tijuana and Playas de Rosarito. The primary sources of input were official maps provided by the Tijuana Municipal Institute (IMPLAN) and the Playas de Rosarito Urban Planning (Direccíon de Planeación) and Development General Office (Desarrollo Urbano de Playas de Rosarito).

Based on the information submitted, the developed area of Tijuana consists of approximately 54,363 acres (22,000 hectares) representing approximately 25 percent of the area of the municipality. The territorial distribution of land use can be observed in the maps that show the main land uses projected for Tijuana and Rosarito for the year 2000.

The developed area of Playas de Rosarito occupies 8,402 acres (3,400 hectares), representing approximately 7 percent of the municipal territory. The residential land use represents almost 54 percent in Rosarito and 75 percent of the Tijuana urban area.

An important project is currently being developed, called the Corredor Tijuana 2000, which has the goal of consolidating the infrastructure and provision of services to encourage the urban development of Tijuana, Rosarito and Tecate in areas where development is more appropriate based on land use plans and projections. The project will concentrate the intensified economic activity among the municipalities in a well-planned corridor that will extend from the eastern part of Tijuana to the southern end of the current Rosarito urban area.

Commerce and services

There are two important zones in Tijuana that can be clearly defined. The first zone is the Downtown area and the River Zone with an approximate area of 618 acres (250 hectares). This area is important because it brings together the main commercial and financial activities, a historical center, international tourism and government activities. In addition, this zone includes the San Ysidro crossing, which is the main point of entry or departure for those coming into or leaving the country. The second important zone is distributed from the northwest to the southeast around Agua

Caliente, Diaz Ordaz and Federico Benitez Boulevards on a 10-km (6-mile) main highway where commercial and financial activities are conducted to support the local and regional-national markets.

In the last decades, work has been conducted on projects to decentralize commercial and service activities in the Otay and the La Presa areas through development of small shopping malls that focus on enabling those who live in the east and southeast portions of the city to avoid long distance travel and traffic congestion.

Industry

The major maquiladora (factory) industries have opened primarily in industrial parks or centers because of the size of the industrial plants and the availability of the infrastructure and services that they require. Nevertheless, some smaller maquiladoras (factories) have opened in business and residential districts. Twenty-eight industrial parks, most located in the Otay, La Mesa, and La Presa Districts, are the principal centers of maquiladora (factory) activity.

Industry in Tijuana is distributed according to different development phases. One primarily notices a central axis in the Zona Centro (downtown), along with Colonia Libertad (Liberated Neighborhood), as one of the city's first poles of industrial activity. There is also industrial expansion parallel to the Tijuana Riverbed, running south-southeast toward the Abelardo L. Rodríguez Reservoir.

In Mesa de Otay, developed more recently, a series of industrial parks has been set up beginning at the Tijuana Airport and running east toward the toll highway to Tecate. In addition, a series of industrial plants has opened southeast of the city.

The establishment of the Toyota plant in Tijuana will generate new sources of employment and will help create other smaller business activity. As far as basic necessities, the installation of this plant will generate the development of water and sanitation systems, and the delivery of electricity and telephone service.

The Toyota plant will likely change current land use, since many of its future workers will prefer to live near it. This will mean that schools as well as a basic health care clinic will be needed.

Industrial activity in Rosarito is practically null, being limited to electricity generation by the Federal Electricity Commission, (Comisión Federal de Electricidad), (CFE).

1.7 Existing Infrastructure

1.7.1 Existing Potable Water System

The Tijuana and Rosarito Potable Water System, managed by the State Commission for Public Services for Tijuana (Comisíon Estatal de Servicios Públicos de Tijuana, CESPT), consists of two aqueducts, two reservoirs, two water treatment plants, several groundwater wells, and a distribution system divided into conveyance lines, supply distribution pipelines, storage tanks, small pumping stations, and chlorination systems.

The primary sources of water in the study area are: (1) the Colorado River; (2) the Río Tijuana/Alamar aquifer; (3) La Misión Aquifer; (4) the Rosarito Aquifer; (5) surface-water runoff captured in the El Carrizo and Abelardo L. Rodríguez Reservoirs.

In 2001, the Colorado River provided approximately 94.5 percent of the water supplied by CESPT, groundwater sources contributed 4.5 percent of the total, and surface runoff accounted for 1 percent. Rosarito's Aquifer Wells were out of service during most of 2001 because of seawater intrusion problems.

The Canal Alimentador (Feeder Canal), an open channel from the Morelos Reservoir located west of Yuma, carries the Colorado River water, which travels approximately 16.33 miles (26.28 km) to the control and sedimentation tanks at Pump Station No. 0 (PB-0), 9 miles (15 km) east of Mexicali, Baja California. The tanks have a capacity of 42,835 yd3 (32,750 m3).

An intake main extracts Colorado River water directly from the river and the water then goes to Tijuana through a 78 miles (125 km) long aqueduct with a maximum capacity of 5 yd 3/s (4 m3/s), which controls a static load 3,478 feet (1,060 m) in height. After traveling 70 miles (112 km), the aqueduct's waters arrive at El Carrizo Reservoir, which has a storage capacity of 52 million yd3 (40 million m3). From El Carrizo Reservoir, the water is sent to El Florido Water Treatment Plant, which also has a designed capacity of 5 yd 3/s (4 m3/s).

Throughout its alignment, the aqueduct has six pump stations, each equipped with four 1500 HP pumps, for a flow of 352 gals/s (1,333 l/s) for each unit (3 operate and one is in reserve). The pumps lift the water to 5249 ft (1,600 m) above m.s.l., after which gravity carries it to El Carrizo Reservoir, where it is stored to eventually supply the El Florido Water Treatment Plant.

Some Colorado River water is occasionally sent from El Carrizo to Abelardo L. Rodríguez Reservoir for storage and eventual treatment in the Abelardo L. Rodríguez Water Treatment Plant, which has a designed capacity of 185 gal/s (700 l/s). The flow that goes to the Abelardo L. Rodríguez Reservoir varies depending on the demand for water at the El Florido Water Treatment Plant.

Groundwater extraction is achieved by using 15 wells, most located on the Río Tijuana/Alamar Aquifer and the remainder on the Rosarito and La Misión Aquifers. The water from the Río Tijuana/Alamar wells is injected into conveyance lines from the El Florido Water Treatment Plant and sent to control tanks. The water from these wells is not chlorinated, but it is assumed that disinfection occurs when the water mixes with the chlorinated water from the water treatment plant. The water from the Rosarito Aquifer is pumped directly to the distribution system following chlorination. Finally, the water from the La Misión Aquifer is chlorinated and delivered by the La Misión-Rosarito Aqueduct to a control tank in Rosarito. Besides the collection of water from the Colorado River and the region's aquifers, CESPT receives part of its supply from surface runoff captured in the Abelardo L. Rodríguez Reservoir, which has a capacity of 179 million yd^3 (137 million m^3), as well as runoff captured in El Carrizo Reservoir.

Figure 1-2 shows the location of the main sources of supply and principal potable-water aqueducts for Tijuana and Playas de Rosarito.

In 2001, CESPT registered a total of 327,753 water connections, 305,546 for residential use, 18,670 for commercial use, 2,493 for industrial use, and 1,098 for governmental use.

1.7.2 Existing Wastewater Disposal System

The wastewater disposal system for the cities of Tijuana and Rosarito consists, in general terms, of a collection system made up of water conduits, main and secondary sewers, interceptors, emitters, small pump stations, wastewater treatment plants, and conveyance lines that transport the collected water to treatment plants.

Most of the sewer collection system's service area is located within the Tijuana River basin; the river crosses the city and flows north into the United States, ultimately flowing into the Pacific Ocean (Figure 1-3). The topography of Tijuana causes the city's drainage to run naturally toward the Tijuana River and beyond to the United States. Nevertheless, various infrastructure works intercept the water flow within Mexican territory for its eventual delivery to the San Antonio de Los Buenos Wastewater Treatment Plant, located in southern Tijuana.

The remaining wastewater collected within the Tijuana River basin, at approximately 291 gal/s (1,100 l/s), flows toward the United States for its eventual treatment in the International Wastewater Treatment Plant (PITAR) (SBIWTP), located in San Diego.

Insert Figure 1-2

Insert Figure 1-3

The treated water is discharged 2.9 miles into the Pacific Ocean through an underwater ocean outfall pipe.

The wastewater generated in areas of the city outside the Tijuana River basin flows naturally within Mexican territory toward the Pacific Ocean. Some of this water is treated before being discharged into the ocean. Playas de Rosarito has its own treatment plant based on aerated ponds, with a designed capacity of 24 gal/s (90 l/s). Similarly, the San Antonio del Mar and Puerto Nuevo Treatment Plants have capacities of 0.7 and 0.4 gal/s (25 and 1.5 l/s), respectively.

Service Levels

In December 2000, CESPT recorded 261,248 discharge connections to the sewer collection system. Of these, 240,929 were residential, 17,124 commercial, 2,253 industrial, and 942 governmental.

The number of residential accounts at the end of 2000 (240,929) represents 86 percent of all residential buildings in Tijuana and Rosarito in that year (278,817). Similarly, based on INEGI's occupancy indexes, approximately 988,000 residents had sewer service, which represents roughly 86 percent of the population living in Tijuana and Rosarito in 2000.

Of the total population, 14 percent does not have access to the sewer collection system and depend instead on latrines, septic tanks, and open-air discharges to satisfy their wastewater disposal needs. Some private companies provide septic tank cleaning with tankers or cistern trucks. The material produced in the cleaning is transported to treatment plants operated by CESPT for treatment and disposal.

As in the case of potable water, INEGI shows lower levels of service coverage for 2000 than those reported by CESPT. Also as with potable water, apart from the fact that the INEGI data is from 2000, while CESPT data is from 2001, a possible cause of this discrepancy is that the CESPT customer registry includes repeated accounts and accounts that are no longer in service.

Treatment and Disposal Levels

In the study area, there are five wastewater treatment plants, which vary in capacity from 0.7 to 291 gal/s (25 to 1,100 l/s). Two plants treat wastewater from Tijuana, one treats wastewater from Playas de Rosarito, and the remaining two serve San Antonio del Mar and Puerto Nuevo. The last two plants are of less relevance to the development of this plan, due to their location and low treatment capacity. Figure 1-4 shows the location of the five treatment plants.

The wastewater generated in Tijuana is treated in the San Antonio de Los Buenos Wastewater Treatment Plant, located 11 miles (18 km) south of Tijuana, next to the Pacific Ocean, and in the SBIWTP, located in San Diego. The SBIWTP, despite its U.S. location, treats exclusively the flows generated by Tijuana.

Insert Figure 1-4

The area's topography provides a natural canalization of the wastewater, leading it to the Río Tijuana and ultimately to the United States. Pumping plant PB-1 is located near the border and intercepts part of the wastewater flow for its eventual transmission to San Antonio de Los Buenos. Gravity carries the rest of the flow to SBIWTP.

Both plants discharge their wastewater into the ocean. San Antonio de Los Buenos Wastewater Treatment Plant uses an open channel that leads directly to the coast, while SBIWTP uses an underwater outfall that discharges 2.9 miles (4.8 km) out to sea.

SBIWTP currently provides advanced primary treatment, and it has an average capacity of 291 gal/s (1,100 l/s). There are plans to construct a secondary treatment module in the future, although the type and location of secondary treatment has yet to be determined.

The San Antonio de Los Buenos Plant is based on an aerated pond system and is designed for an average flow of 198 gal/s (750 l/s). It is currently undergoing renovation that will increase its treatment capacity to an average of 291 gal/s (1,100 l/s). The renovation consists primarily of the addition of more blowers to the aerating ponds and in the division of the sedimentation tank. The renovation began in December 2001 and will be completed in 2003.

On average 334 gal/s (1,265 l/s) of wastewater arrived at the plant during 2001. Approximately 97 gal/s (366 l/s), or 29 percent of the flow, eludes the treatment process. This wastewater is chlorinated and mixed with the discharge from the treatment system before being released into the ocean. With the completion of the expansion project, the untreated water will also be treated in the near future.

Three Official Mexican Regulations, (Normas Oficiales Mexicanas, NOMs), establish the maximum allowable limits for wastewater discharges, depending on the recipient body of water or the use to which the wastewater will be put. NOM-001-ECOL-1996 sets the maximum allowable municipal discharges to the nation's bodies of water. NOM-002-ECOL-1996 sets maximum concentrations for discharges to sewer systems, particularly industrial discharges. NOM-003-ECOL-1997 sets the quality standards for recycled wastewater.

Tables 1-3, 1-4 and 1-5 show the parameters that each NOM has set and the maximum allowable limits.

Table 1-3
Maximum Allowable Limits for Discharges to Recreational-Use Coastal Waters
NOM-001-ECOL-1996

Parameters (mg/l, except where otherwise specified)	Monthly Average	Daily Average
Temperature (°C)	40	40
Grease and Oil	15	25
Floating Matter	Absent	Absent
Sedimented Solids (ml/l)	1	2
Total Suspended Solids	75	125
Biochemical Oxygen Demand ($BCOD_5$)	75	150
Total Nitrogen	N.A.	N.A.
Total Phosphorous	N.A.	N.A.
Total Arsenic	0.2	0.4
Total Cadmium	0.2	0.4
Total Cyanide	2.0	3.0
Total Copper	4.0	6.0
Total Chromium	1	1.5
Total Mercury	0.01	0.02
Total Nickel	2	4
Total Lead	0.5	1
Total Zinc	10	20
Fecal Coliform (MPN)/100 ml)	1000	2000

Source: Federal Environmental Protection Agency.
Secretary of the Environment, Natural Resources, and Fishing (SEMARNAP).

Table 1-4 **Maximum Allowable Limits for Contaminants in Wastewater Discharges to Urban or Municipal Sewer Collection Systems** **NOM-002-ECOL-1996**			
Parameters (mg/l)	**Monthly Average**	**Daily Average**	**Instantaneous**
Grease and Oil	50	75	100
Sedimented Solids	5	7.5	10
Total Arsenic	0.5	0.75	1
Total Cadmium	0.5	0.75	1
Total Cyanide	1	1.5	2
Total Copper	10	15	20
Hexavalent Chromium	0.5	0.75	1
Total Mercury	0.01	0.015	0.02
Total Nickel	4	6	8
Total Lead	1	1.5	2
Total Zinc	6	9	12
Source: Federal Environmental Protection Agency. Secretaria de Medio Ambiente, Recursos Naturales y Pesca (SEMARNAP).			

Table 1-5 **Maximum Allowable Limits for Contaminants in Treated Wastewater for Public Re-Use** **NOM-ECOL-003-1997**					
	Monthly Average				
Type of Re-Use	**Fecal Coliform MPN/100 ml**	**Helminth Eggs (eggs/l)**	**Grease and Oil (mg/l)**	**$BCOD_5$ (mg/l)**	**Total Suspended Solids (mg/l)**
Direct Contact Services	240	≤ 1	15	20	20
Indirect or Occasional Contact Services	1,000	≤ 5	15	30	30
Source: Procuraduría Federal de Protección al Ambiente. (Federal Environmental Protection Agency) Secretaria de Medio Ambiente, Recursos Naturales y Pesca (SEMARNAP).					

The 2001 data provided by CESPT show that the collection of wastewater in Tijuana averaged 7,870,105 yd^3/month (6,017,130 m^3/month) and 126,066 yd^3/month (96,384 m^3/month) in Playas de Rosarito. The first set of data was obtained by measurements made by CEPST personnel in the wastewater pump stations. Of this volume, 6,710,061 yd^3/month (5,130,210 m^3/month) was treated in Tijuana and San Diego, and 125,667 yd^3/month (96,079 m^3/month) was treated in Rosarito, which represents 85 percent of the wastewater captured in Tijuana and 100 percent of that captured in Rosarito.

Note that the volume of wastewater captured and measured is not necessarily equal to the volume generated, presumably residual flows exist that do not reach the sewer collection system or which exit as leaks and overflows prior to reaching the pump station or treatment plants.

The percentages of treated water mentioned earlier correspond to water measured at the various CESPT control points, including Arroyo Alamar and Río Tijuana. The flow in these riverbeds includes storm runoff and upstream wastewater discharges from areas of Tijuana and Tecate that are without access to the sew er system providing an average rate of flow of 140 l/s. The Río Tijuana waters are intercepted in the CILA pump station, from which they are sent to the San Antonio de Los Buenos Wastewater Treatment Plant.

According to agreements between Mexico and the United States, the CILA station pumps less than 132 gal/s (500 l/s), while flows greater than 132 gal/s (500 l/1) which correspond to the flow of the river during storms, are allowed to flow toward the United States and discharge into the ocean.

The sludge volume generated at the SBIWTP is approximately 144 yd^3/day (110 m^3/day). The sludge from this plant is sent to Mexico for its disposal-on site at the San Antonio de Los Buenos Plant. The sludge produced at the San Antonio de Los Buenos Plant is accumulated in the ponds.

Table 1-6 shows the plants that CESPT operates, and their designed and actual flow rates.

Table 1-6
Wastewater Treatment Plants Operated by CESPT

No.	Wastewater Treatment Plant	Designed Flow (l/s)	Actual Flow Rates (2001) (l/s)
1	SBIWTP*	1,100	1,100
2	San Antonio de Los Buenos	1,100	899
3	Rosarito	90	37
4	San Antonio del Mar	2.5	2.2
5	Puerto Nuevo**	1.5	1.5
	Total	2,294	2,040

* Operated by IBWC to treat wastewater flows from Tijuana
**The data for this plant are for 2002.
Source: Sewage Division, CESPT.

In addition to the existing plants, CESPT is in the process of designing 4 WWTPs commonly referred to as the “Japanese Credit” plants, since they will be funded by Japanese institutions. These plants are scheduled to start operation around the year 2005. Section 2 shows the capacities of these plants in the tables describing the EA alternatives.

Section 2
Description of Alternatives

2.1 Formulation and Initial Screening of Alternatives

In formulating a master plan to meet the growing need for improvements in the water and sanitation systems in the project area, several alternative concepts were formulated for each system. More specifically, three alternatives were formulated for the water system and four alternatives were formulated for the sanitation system. The initial alternatives formulated relative to the water system provided various options to enhance future water supplies, such as the desalination of seawater, indirect potable water reuse, and provision of additional water from the Colorado River. Alternatives related to the sanitation system included various combinations of constructing new wastewater treatment plants and expanding/improving existing treatment plants. The nature and focus of each of the water system and wastewater system alternatives are summarized below in Table 2-1.

Table 2-1
Initial Alternatives for Water System and Sanitation System

Water System Alternatives	Sanitation System Alternatives
Alternative B – Maximize desalination of seawater	*Alternative B* – Treatment plant in the Río Alamar area
Alternative F – Desalination of seawater together with indirect potable reuse	*Alternative C* – Treatment plants in the Río Alamar and coastal areas
Alternative G – Desalination of seawater, additional water from the Colorado River and indirect potable reuse	*Alternative D* – Treatment plant in the coastal area
	Alternative E – Treatment plant in the Río Alamar area and expansion of the La Morita plant

In moving towards the development of an overall master plan for both the water and the wastewater systems, various combinations of the systems alternatives were formulated. Table 2-2 presents the 12 alternative combinations that were formulated and initially evaluated. The first letter in the Combination Alternative labeling represents the Water System Alternative described in Table 2-1 above, and the second letter represents the Sanitation System Alternative from above.

Table 2-2
Combination Water and Sewer Systems Alternatives

Combination Alternative (Water – Sanitation)	Description
B - B	Maximize desalination of seawater and construction of a wastewater treatment plant in the Río Alamar area
B - C	Maximize desalination of seawater and construction of wastewater treatment plants in the Río Alamar and coastal areas
B - D	Maximize desalination of seawater and construction of a wastewater treatment plant in the coastal area
B – E	Maximize desalination of seawater and construction of a wastewater treatment plant in the Río Alamar area and expansion of the La Morita WWTP

Table 2-2 Combination Water and Sewer Systems Alternatives	
Combination Alternative (Water – Sanitation)	**Description**
F - B	Desalination of seawater and indirect potable reuse; and construction of a wastewater treatment plant in the Río Alamar area
F-C	Desalination of seawater and indirect potable reuse; and construction of wastewater treatment plants in the Río Alamar and coastal area
F-D	Desalination of seawater and indirect potable reuse; and construction of a wastewater treatment plant in the coastal area
F-E	Desalination of seawater and indirect potable reuse; and construction of a wastewater treatment plant in the Río Alamar area and the expansion of the La Morita WWTP
G-B	Desalination of seawater, additional water from the Colorado River and indirect potable reuse; and construction of a wastewater treatment plant in the Río Alamar area
G-C	Desalination of seawater, additional water from the Colorado River and indirect potable reuse; and construction of a wastewater treatment plant in the Río Alamar area and in the coastal area
G-D	Desalination of seawater, additional water from the Colorado River and indirect potable reuse; and construction of a wastewater treatment plant in the coastal area
G-E	Desalination of seawater, additional water from the Colorado River and indirect potable reuse; and construction of a wastewater treatment plant in the Río Alamar area and expansion of the La Morita WWTP

Initial Screening of Alternative

Eight criteria were used for the initial screening of the 12 alternatives summarized above. The criteria include the following:

- Total annualized cost (which considers the investment and operation and maintenance costs);
- Level of environmental impact;
- Level of implementation risk;
- Percentage of total supply coming from the primary water source;
- Proportion of extracted groundwater to artificial aquifer recharge;
- Reduction of water volume discharged into transborder water courses;
- Efficient sludge handling; and
- Percentage of effluent reused.

Prioritization of the alternatives was approached in terms of how well each alternative met the master plan objectives that are embodied in the above criteria. To do this evaluation, the decision-making in the initial screening of alternatives was based on the Simple Multi-Attribute Rate Technique, which is described more fully in Section 12 of the Master Plan as is also the overall screening process.

The alternatives that were considered to be the most responsive to the screening criteria are Alternatives F-B, F-E, and G-E (referred to as Alternatives 1, 2, and 3, respectively in this EA). For the purpose of this EA, Alternative F-E (Alternative 2) is considered to be the preferred alternative. The following are some noteworthy elements arising from making an individual analysis of the water and sanitation systems alternatives:

- For the Water System Alternatives, desalination is an option that should be implemented in any of the alternatives since it shows substantial benefits and could be a viable near-term option.
- Potable reuse in the context of Water System Alternatives appears to be more suitable for later implementation since the costs are high and the implementation risks are higher than those for desalination.
- The analysis shows that the importing water from the Colorado River within the context of a Water System Alternative is worth considering. Alternative G-E, which includes the construction of a new aqueduct to convey water from the Colorado River, currently entitled to Mexico, and construction of a new reservoir, consistently ranked high in meeting the objectives of CESPT.
- The Sanitation System Alternatives B and E most consistently meet the plan's objectives, and it is notable that these sanitation system alternatives are very similar. The only difference between Sanitation System Alternatives B and E is the expansion of the *Crédito Japonés* plant in La Morita in Alternative E. Alternatives B and E could have a similar, and even identical, first phase.

Wastewater Treatment Plant Effluent Disposal Options

All of the Sanitation System Alternatives, hence, all of the Combination Alternatives, include the development of new wastewater treatment plants and expansion and/or improvement of existing treatment plants. Three options for the disposal of wastewater treatment plant effluent discharge were considered in the development of the Master Plan. The options include: (1) coastal discharge in Mexico; (2) ocean outfall in Mexico; and (3) ocean outfall in the United States via the existing South Bay Ocean Outfall (SBOO). Based on technical and economic reasons, the Master Plan selected a combination of Options 1 (coastal discharge) and 2 (SBOO). A description of the existing and possible disposal methods for both the base and proposed sanitation infrastructure in the project area is further described in Section 2.6 of this EA. Section 12.6 of the Master Plan provides a more detailed explanation of the selection of effluent discharge methods. It should be noted that the currently preferred disposal option, disposal of effluent through the SBOO, is contingent on future agreements between the United States and Mexico and permitting by the State of California.

The following sections describe the three alternatives that were selected through the initial screening process and carried forth for evaluation in this EA. Also described below is a "no action" alternative, which is required by NEPA to be included in the EA analysis. The following sections describe the three selected alternatives and the no action alternative in detail.

2.2 Alternative 1 (F-B)

The main components of Alternative 1 are: (1) potable water supply improvements including construction of a desalination plant for the direct conversion of seawater to potable water, and the development of a system to supplement potable water supplies through the direct and indirect treatment and reuse of wastewater; and (2) sanitation system improvements including the construction of five new wastewater treatment plants and the expansion of one existing plant. Related infrastructure proposed to support the above improvements would include new pumping facilities and new pipelines. The following describes more specifically the components proposed in Alternative 1, and Figure 2-1 illustrates the general layout of the proposed system.

Insert Figure 2-1

Potable Water Supply Improvements:
Alternative 1 would address the deficit of potable water projected for the year 2023 through the construction of a desalination plant and the implementation of a program of indirect potable reuse. With this alternative, the desalination plant would have a maximum capacity of 55 million gallons per day mgd) (2,450 Liters / second – L / s), while the reuse will provide up to 17 mgd (775 L / s). The proposed desalination plant would occupy a site of approximately *5-acres* anticipated to be located in the coastal area north of Puerto Nuevo and south of Tijuana. Construction of the desalination plant would basically include site preparation (i.e., clearing of site, rough grading to provide level development area as well as other related earthwork to address any site specific conditions such as unstable / unsuitable existing soils, soils engineering / compaction, excavation for subsurface improvements, etc.); building construction; equipment installation; completion of site improvements such as parking areas, landscaping / revegetation, and related hardscape / softscape; and plant testing and startup. Engineering and construction of the desalination plant is estimated to take approximately *36* months.

The program of indirect potable reuse under Alternative 1 would consist of improvements to certain existing wastewater treatment plants (WWTPs) located at the southern edge of urban Tijuana, including the provision of advanced treatment of part of the secondary effluent from the La Morita and the Monte de los Olivos treatment plants through a process of microfiltration and reverse osmosis. The advanced treatment system improvements at the existing WWTPs would involve a physical expansion to incorporate microfiltration / reverse osmosis equipment that would occupy 2 to 3 acres. Construction activities would be essentially the same as those discussed for construction of the desalination plant. Additionally, construction of a new WWTP at Alamar (see description below) would include such advanced treatment systems. The advanced treatment effluent from the two existing WWTPs would be transported to the existing Abelardo L. Rodríguez reservoir, where it would be stored. A new shoreline intake structure may be required at the reservoir. While stored in the reservoir, the treated effluent could be mixed with water from the Colorado River or with surface runoff; therefore its quality could be modified. The water extracted from the reservoir will be further treated through a conventional filtration process before being sent to the existing potable water distribution network. Under Alternative 1, the advanced treatment effluent from the proposed Alamar Regional plant would be routed to existing and new groundwater injection wells as a means of groundwater recharge to the Río Alamar aquifer. Through natural processes, the injected water would mix with the underground aquifer water, flow very slowly downgradient to a downstream area where existing and new groundwater extraction wells would be used to make the potable water available for use.

It is estimated that approximately 70% of the secondary effluent treated in the microfiltration and osmosis process will be recovered as high-quality effluent, while the remaining 30% would not be suitable for reuse. For planning purposes it is anticipated that approximately 80% of the advanced treated effluent routed to the reservoir would be recoverable for purification and subsequent use as potable water, and that the remaining 20% would be lost through evaporation and infiltration. Similarly, it is estimated that approximately 70% of the advanced treated effluent injected to the aquifer would be recovered for reuse. Based on the above, approximately 56% of the effluent from the La Morita and Monte de los Olivos plants could be reused, and approximately 50% of the effluent from the Alamar Regional plant could also be reused.

Under Alternative 1, the El Florido and Abelardo L. Rodríguez water treatment plants will remain in operation, after renovation, to treat water coming from the Colorado River with a capacity of 102 mgd (4,500 L/s).

Table 2-3 shows the components of the potable water supply system proposed under Alternative 1, both in terms of the base infrastructure (i.e., existing potable water supply facilities) and proposed infrastructure (i.e., improvements proposed under Alternative 1), which together are planned to provide for future long-term potable water demands within the Master Plan study area.

Table 2-3
Potable Water Supply System for Alternative 1

Project	Water Source	Maximum Capacity (mgd / L/s)	Average operational flow (mgd/L/s)
Base Infrastructure:			
El Florido water treatment plant	Colorado River	91/4,000	91/4,000
Abelardo L. Rodríguez water treatment plant	Colorado River	11/500	11/500
Río Alamar/Río Tijuana aquifer wells	Tijuana/Alamar Aquifer	4/180	4/180
Monte de los Olivos water treatment plant	Aquifer Tijuana/Alamar	6/250	6/250
La Misión wells	La Misión wells	1/51	1/51
Proposed Infrastructure:			
Desalination Plant	Pacific Ocean	56/2,450	1,082
Microfiltration/reverse osmosis at La Morita and Monte de los Olivos (1) WWTPs	Effluent from La Morita and Monte de los Olivos WWTP	2/588	2/588
Microfiltration/reverse osmosis at Alamar Regional (1) WWTP	Effluent from Alamar Regional WWTP	10/420	10/420
New wells (Extraction of the aquifer recharge)	Alamar Aquifer	7/300	7/300
Water treatment plant for reuse flows from the Rodríguez reservoir	Effluent from the La Morita and Monte de los Olivos WWTPs	11/475	11/475
Total		**187/8,206**	**156 / 6,838**

(1) Those are part of the projects required for water production that will be stored in the reservoir and treated at a later time, or injected to the aquifer, therefore it is not included as potable water for distribution or in the total amount.

In conjunction with the proposed potable water supply system described above, a number of pump stations and conveyance pipelines would be required, most of which would be new although some of the improvements would occur as renovation of existing facilities. Table 2-4 summarizes the general nature and size of the main infrastructure improvements associated with the potable water supply system under Alternative 1.

Table 2-4
Infrastructure Improvements Related to Potable Water Supply System Improvements Under Alternative 1

Nature of Improvement	Description
Conveyance of effluent from La Morita WWTP to Monte de los Olivos WWTP (1)	Provision of 1,900 horsepower (hp) of pumping capacity through approximately 21,342 feet (6,505 meters (m)) of new pipeline that is approximately 30 inches (76 centimeters (cm)) in diameter.
Conveyance of advanced treated effluent from Monte de los Olivos WWTP to Abelardo L. Rodríguez Reservoir	Provision of 1,144 hp of pumping capacity through approximately 30,180 feet (9,199 m) of new pipeline that is approximately 24 inches (61 cm) in diameter.
Conveyance of advanced treated effluent from Alamar Regional WWTP to the groundwater injection well site(s) for aquifer recharge	Provision of 1,206 hp of pumping capacity through approximately 7,238 feet (2,206 m) of new pipeline that is approximately 24 inches (61 cm) in diameter.
Seawater pipeline to new desalination plant	Provision of approximately 6,398 feet (1,950 m) of new pipeline that is approximately 84 inches (213 cm) in diameter.
Storage Tanks to Store Treated Potable Water	Thirteen new storage tanks with capacities ranging from approximately 0.13 to 5.3 million gallons (MG)(500 to 20,000 cubic meters (m^3).
Water Mains	Provision of approximately 294,159 feet (89,660 m) of new water mains with diameters from 12 in (30cm) to 60 (152 cm)
Pumping Plants	Provision of 10 pumping plants with capacities ranging from 100 to 7,600 hp
Potable Water Supply Pipelines to Increase Service Coverage	Provision of 885,863 ft (270,012 m) of potable water supply pipelines with diameters ranging from 4 in (10 cm) to 18 in (46 cm)
Supply Pipelines from Primary Network to Areas of Future Growth	Provision of 4,659,159 ft (1,420,116 m) of potable water supply pipelines
Renovation of Existing Supply Pipelines	The renovation of 812,326 in (247,598 m) of supply pipelines that are in poor condition.

[1] The secondary effluent from La Morita for reuse will be sent to Monte de los Olivos, where the microfiltration/reverse osmosis process will take place for the secondary effluent of both plants.

It is important to note that although the general nature and size of the infrastructure improvements described in Table 2-4 can be, and have been, estimated for the purpose of the Master Plan, the exact nature, size, and location / alignment of such improvements is not known at this time. Such information would be determined in conjunction with future more detailed design and evaluation of the selected alternative.

Sanitation System Improvement:

The sanitation of wastewater under Alternative 1 would occur through 12 treatment plants (see Table 2-5) including: three existing plants currently in operation; four new plants that will be constructed by CESPT before 2005 as part of the *Crédito Japonés* (Japanese Credit) program; one existing plant that will be expanded as part of this alternative; and five new plants that would be built as part of this alternative. For planning purposes at this conceptual level, activated sludge processes were used to estimate costs and effluent quality at the five new plants. This assumption does not preclude the use of other treatment methods as appropriate. Furthermore, as described above, the Alamar plant and the La Morita and Monte de los Olivos plants would provide an additional level of treatment.

Table 2-5
Sanitation Projects for Alternative 1

Project	Locations served	Average Capacity (mgd/L/s)
Base Infrastructure:		
International Plant	Tijuana	25 / 1,100
San Antonio de los Buenos	Tijuana	25 / 1,100
Rosarito I	Rosarito	1 / 50
Crédito Japonés plants[1]:		
La Morita	Tijuana	9 / 380
Monte de Los Olivos	Tijuana	10 / 460
Tecolote-La Gloria	Tijuana	9 / 380
Rosarito II	Rosarito, Tijuana	5 / 210
Proposed Infrastructure:		
Alamar Regional	Tijuana	33 / 1,470
Rosarito I Expansion	Rosarito	2 / 70
Popotla	Popotla, Califa, South of Rosarito	3 / 130
Mesa del Descanso	Mesa del Descanso	0.5 / 20
Puerto Nuevo	Puerto Nuevo, Primo Tapia	0.5 / 20
La Misión	Santa Anita	0.25 / 10
Total Supply		**123 / 5,400**
Average daily demand		123 / 5,385

[1] These plants are not recommended actions in the Master Plan. They are considered part of the base conditions.

Development of the sanitation projects described above would be accompanied by related infrastructure improvements such as pumping projects and pipelines. Table 2-6 summarizes the principal pumping requirements and piping projects associated with the sanitation projects proposed under Alternative 1.

Table 2-6
Principal Wastewater and Effluent Piping Projects of Alternative 1

Treatment Plant	Pumping (hp)	Main (feet/meters in length, inches/cm in diameter)
Raw Wastewater:		
Alamar Regional	4,950	35,410 / 10,793 48 / 122
Rosarito I	280	12,060 / 3,676 14 / 36
Popotla	60	20,744 / 6,323 8 / 20
Mesa del Descanso	60	41,840 / 12,753 8 / 20
Puerto Nuevo	60	23,848 / 7,269 8 / 20
La Misión	10	4,337 / 1,322 8 / 20
Effluent:		
Monte de los Olivos, La Morita and Alamar	N/A	118,388 / 36,085 24 / 61 and 84 / 213
Tecolote - La Gloria	N/A	1640 / 500 36 / 91
Rosarito II	N/A	1640 / 500 24 / 61
Popotla	N/A	1640 / 500 10 / 25
Mesa del Descanso	N/A	1640 / 500 10 / 25
Puerto Nuevo	N/A	1640 / 500 10 / 25
La Misión	N/A	1640 / 500 10 / 25

Under Alternative 1, the Monte de los Olivos, La Morita and Alamar Regional plants would have shared infrastructure for the handling of the effluent, which would then be transported to the South Bay Land Outfall (SBLO), which connects to the South Bay Ocean Outfall (SBOO) for disposal. The first pipeline would transport the effluent from the La Morita and Los Olivos plants up to a point near the convergence of the Tijuana and Alamar rivers, where it would join with the pipeline from the Alamar plant. A second pipeline would convey the effluent from the convergence of these two lines to the U.S.-Mexico border, following the course of the Tijuana River. From that point, there would be a short segment (i.e., approximately 1,500 feet (457 m) of pipeline extending into the United States to connect with the SBLO. The subject pipeline segment would enter the United States at the intersection of Monument Road and Old Dairy Mart Road, near the southwest corner of Section 2, Township 19 South, Range 2 West. The pipeline would extend directly north along Old Dairy Mart Road, which defines the west boundary of the existing IWTP, to connect with the existing SBLO (Figure 2-2). The pipeline would be approximately 84 inches in diameter and would be installed using an open trench method. The pipeline trench would be approximately 20 to 25 feet wide and 12-14 feet deep, and would occur within a construction corridor approximately 15 feet wide on either side of the trench. The construction area associated with the connection of the effluent line to the SBLO would be approximately 100 feet by 100 feet.

In addition to the above sanitation-related infrastructure improvements, approximately 566,087 feet (172,544 m) of primary (collectors and sub-collectors) sewer lines (with diameters of 15 to 100 inches / 38 to 76 cm) would be constructed; 2,980,244 feet (908,381 m) of secondary (laterals) sewer lines (with diameters of 8 to 12 inches / 20 to 30 cm) would increase the service coverage to 100% of the population; 3,818,082 feet (1,163,755 m) of sewer lines (with diameters of 8 to 12 inches / 20 to 30 cm) would be constructed to satisfy the demands created by future growth; and 2,029,446 feet (618,577 m) of existing sewer lines that are in poor condition (with diameters of 8 to 12 inches / 20 to 30 cm) would be renovated under Alternative 1.

As noted above relative to the infrastructure improvements associated with the potable water supply system, only the general nature and size of the infrastructure improvements anticipated for any of the Master Plan alternatives have been estimated for the purpose of the Master Plan. The exact nature, size, and location / alignment of such improvements would be determined in conjunction with future more detailed design and evaluation of the selected alternative.

Insert Figure 2-2

2.3 Alternative 2 (F-E)

Alternative 2 was identified in the Master Plan as the preferred option. The main components of Alternative 2 are: (1) potable water supply improvements including construction of a desalination plant for the direct conversion of seawater to potable water, and the development of a system to supplement potable water supplies through the direct and indirect treatment and reuse of wastewater; and (2) sanitation system improvements including the construction of construction of five new wastewater treatment plants and the expansion of two existing plants. Related infrastructure proposed to support the above improvements would include new pumping facilities and new pipelines. The following describes more specifically the components proposed in Alternative 2, and Figure 2-3 illustrates the general layout of the proposed system.

Potable Water Supply Components:

The components of the water system of this alternative are very similar to those in Alternative 1, with the difference that the expansion of the La Morita wastewater treatment plant will allow for an increase in the amount of indirect potable reuse through discharge into the Abelardo L. Rodríguez reservoir. This will allow the capacity of the desalination plant to be reduced. With this alternative, the desalination plant would have a maximum capacity of 49 million gallons per day mgd) (2,170 Liters/second – L/s), while the reuse will provide up to 24 mgd (1,051 L/s). The amount of indirect potable reuse of the effluent from the Alamar Regional

Figure 2-3

plant will stay the same. Table 2-7 shows the components of the potable water supply system proposed under Alternative 2, both in terms of the baseline infrastructure (i.e., existing potable water supply facilities) and proposed infrastructure (i.e. improvements proposed under Alternative 2), which together are planned to provide for future long-term potable water demands within the Master Plan study area.

Table 2-7
Potable Water Projects for Alternative 2

Project	Water source	Maximum Capacity (mgd / L/s)	Average operational flow (mgd/L/s)
Base Infrastructure:			
El Florido water treatment plant	Colorado River	91 / 4,000	91 / 4,000
Abelardo L. Rodríguez water treatment plant	Colorado River	11 / 500	11 / 500
Río Alamar/Río Tijuana aquifer wells	Tijuana/Alamar Aquifer	4 / 180	4 / 180
Monte de los Olivos water treatment plant	Tijuana/Alamar Aquifer	6 / 250	6 / 250
La Misión wells	La Misión Aquifer	1 / 51	1 / 51
Proposed Infrastructure:			
Desalination Plant	Pacific Ocean	50 / 2,170	18 / 806
Microfiltration/reverse osmosis at La Morita and Monte de los Olivos [1] WWTPs	Effluent from La Morita and Monte de los Olivos WWTPs	21 / 931	21 / 931
Microfiltration/reverse osmosis at Alamar Regional [1] WWTP	Effluent from Alamar Regional WWTP	14 / 600	14 / 600
New wells (Extraction of the aquifer recharge)	Alamar Aquifer	7 / 300	7 / 300
Water treatment plant for the reuse flows from the Rodríguez reservoir	Effluent from the La Morita and Monte de los Olivos WWTPs	17 / 751	17 / 751
Total Supply		**18 / 8,202**	
Average daily demand			16 / 6,838
Maximum daily demand		18 / 8,206	

(1) These are part of the projects required for water production that will later be purified, but is not included as potable water for distribution or in the total amount.

Similar to Alternative 1, a number of pump stations and conveyance pipelines would be required for Alternative 2, most of which would be new although some of the improvements would occur as renovation of existing facilities. Table 2-8 summarizes the general nature and size of the main infrastructure improvements associated with the potable water system under Alternative 2.

Table 2-8
Infrastructure Improvements Related to Potable Water Supply System Improvements Under Alternative 2

Nature of Improvement	Description
Conveyance of effluent from La Morita WWTP to Monte de los Olivos WWTP (1)	Provision of 1,900 horsepower (hp) of pumping capacity through approximately 21342 feet (6,505 meters (m)) of new pipeline that is approximately 30 inches (76 centimeters (cm)) in diameter.
Conveyance of advanced treated effluent from Monte de los Olivos WWTP to Abelardo L. Rodríguez Reservoir	Provision of 1,144 hp of pumping capacity through approximately 30180 feet (9,199 m) of new pipeline that is approximately 24 inches (61 cm) in diameter.
Conveyance of advanced treated effluent from Alamar Regional WWTP to the groundwater injection well site(s) for aquifer recharge	Provision of 1,206 hp of pumping capacity through approximately 7238 feet (2,206 m) of new pipeline that is approximately 24 inches (61 cm) in diameter.
Seawater pipeline to new desalination plant	Provision of approximately 6398 feet (1,950 m) of new pipeline that is approximately 84 inches (213 cm) in diameter.
Storage Tanks to Store Treated Potable Water	Thirteen new storage tanks with capacities ranging from approximately 0.13 to 5.3 million gallons (MG)(500 to 20,000 cubic meters (m^3).
Water Mains	Provision of approximately 294,159 feet (89,660 m) of new water mains with diameters from 12 in (30cm) to 60 (152 cm)
Pumping Plants	Provision of 10 pumping plants with capacities ranging from 100 to 7,200 hp
Potable Water Supply Pipelines to Increase Service Coverage	Provision of 885,863 ft (270,012 m) of potable water supply pipelines with diameters ranging from 4 in (10 cm) to 18 in (46 cm)
Supply Pipelines from Primary Network to Areas of Future Growth	Provision of 4,659,159 ft (1,420,116 m) of potable water supply pipelines
Renovation of Existing Supply Pipelines	The renovation of 812,326 in (247,598 m) of supply pipelines that are in poor condition.

1 The secondary effluent from La Morita for reuse will be sent to Monte de los Olivos, where the microfiltration / reverse osmosis process will take place for the secondary effluent from both plants.

It is important to note that although the general nature and size of the infrastructure improvements described in Table 2-8 can be, and have been, estimated for the purpose of the Master Plan, the exact nature, size, and location / alignment of such improvements is not known at this time. Such information would be determined in conjunction with future more detailed design and evaluation of the selected alternative.

Sanitation:
Alternative 2 is very similar to Alternative 1 (see Table 2-9). The difference is that the Alamar Regional plant will be smaller, while the La Morita *Crédito Japonés* plant will be expanded to compensate for the reduction in size of the Alamar Regional plant. This alternative will have fewer wastewater pumping requirements, since the additional wastewater that will go to La Morita will be collected at the La Morita site

before it flows downstream to the Alamar pump station at the confluence of the Alamar and Tijuana rivers.

Table 2-9
Sanitation Projects for Alternative 2

Project	Locations served	Average Capacity (mgd/L/s)
Base Infrastructure:		
International Plant	Tijuana	25 / 1,100
San Antonio de los Buenos	Tijuana	25 / 1,100
Rosarito I	Rosarito	1 / 50
Crédito Japonés plants[1]:		
La Morita	Tijuana	9 / 380
Monte de Los Olivos	Tijuana	10 / 460
Tecolote-La Gloria	Tijuana	9 / 380
Rosarito II	Rosarito, Tijuana	5 / 210
Proposed Infrastructure:		
Alamar Regional	Tijuana	22 / 980
Rosarito I Expansion	Rosarito	11 / 490
Popotla	Popotla, Califa, South of Rosarito	3 / 130
Mesa del Descanso	Mesa del Descanso	0.5 / 20
Puerto Nuevo	Puerto Nuevo, Primo Tapia	0.5 / 20
La Misión	Santa Anita	0.25 / 10
Total Supply		**123 / 5,400**
Average daily demand		123 / 5,385

[1] These plants are not recommended actions in the Master Plan. They are considered part of the base conditions.

The above-mentioned sanitation projects described above would be accompanied by related infrastructure improvements such as pumping projects and piping. Table 2-10 summarizes the principal pumping requirements and piping projects associated with the sanitation projects proposed. The only difference between this Alternative 2 and Alternative 1 is the necessary infrastructure to transport additional wastewater to the La Morita plant.

Table 2-10
Principal Wastewater and Effluent Piping Projects of Alternative 2

Treatment Plant	Pumping (hp)	Main (feet/meters in length, inches/cm in diameter)
Raw Wastewater:		
Alamar Regional	3,250	35,410 / 10,793 48 / 122
La Morita expansion	750	9,842 / 3,000 30/76
Rosarito I	280	9,842 / 3,000 29 / 76
Popotla	60	20,744 / 6,323 8 / 20
Mesa del Descanso	60	41,840 / 12,753 8 / 20
Puerto Nuevo	60	23,848 / 7,269 8 / 20

Table 2-10 Principal Wastewater and Effluent Piping Projects of Alternative 2		
Treatment Plant	**Pumping (hp)**	**Main (feet/meters in length, inches/cm in diameter)**
La Misión	10	4,337 / 1,322 8 / 20
Effluent:		
Monte de los Olivos, La Morita and Alamar	N/A	118,388 / 36,085 24 / 61 and 84 / 213
Tecolote- La Gloria	N/A	1640 / 500 36 / 91
Rosarito II	N/A	1640 / 500 24 / 61
Popotla	N/A	1640 / 500 10 / 25
Mesa del Descanso	N/A	1640 / 500 10 / 25
Puerto Nuevo	N/A	1640 / 500 10 / 25
La Misión	N/A	1640 / 500 10 / 25

Like Alternative 1, under Alternative 2 the Monte de los Olivos, La Morita and Alamar Regional plants would have shared infrastructure for the handling of the effluent, which would then be transported to the SBLO, eventually connecting to the SBOO for disposal. The construction activities associated with this would be the same as those discussed for Alternative 1.

Similar to the previous alternative, approximately 566,087 feet (172,544 m) of primary (collectors and sub-collectors) sewer lines (with diameters of 15 to 100 inches / 38 to 76 cm) would be constructed; 2,980,244 feet (908,381 m) of secondary (laterals) sewer lines (with diameters of 8 to 12 inches / 20 to 30 cm) would increase the service coverage to 100% of the population; 3,818,082 feet (1,163,755 m) of sewer lines (with diameters of 8 to 12 inches / 20 to 30 cm) would be constructed to satisfy the demands created by future growth; and 2,029,446 feet (618,577 m) of existing sewer lines that are in poor condition (with diameters of 8 to 12 inches / 20 to 30 cm) would be renovated under Alternative 1.

As noted above relative to the infrastructure improvements associated with the potable water supply system, only the general nature and size of the infrastructure improvements anticipated for any of the Master Plan alternatives have been estimated for the purpose of the Master Plan. The exact nature, size, and location / alignment of such improvements would be determined in conjunction with future more detailed design and evaluation of the selected alternative.

2.4 Alternative 3 (G-E)

The main components of Alternative 3 are: (1) potable water supply improvements including construction of a desalination plant for the direct conversion of seawater to potable water, construction of a new aqueduct to transport water from the Colorado river, and the development of a system to supplement potable water supplies through the direct and indirect treatment and reuse of wastewater; and (2) sanitation system improvements including the construction of construction of five new wastewater treatment plants and the expansion of one existing plant. Related infrastructure proposed to support the above improvements would include new pumping facilities and new pipelines. The following describes more specifically the components proposed in Alternative 3, and Figure 2-4 illustrates the general layout of the proposed system.

Potable Water Supply Components:

The components of the water system of Alternative 3 are very similar to those in Alternative 2, with the difference that the construction of a new aqueduct to transport water from the Colorado River will allow the capacity of the desalination plant to be reduced. The additional water that would be diverted from the Colorado River has already been entitled to Mexico; therefore, U.S. water supplies would not be affected. Water supplies in Mexico will be reallocated from agricultural users in Mexicali to urban users. With this alternative, the desalination plant would have a maximum capacity of 16 mgd (690 Liters/second – L/s), while the infrastructure of transport and purification of water from the river will provide up to 40 mgd (1,760 L/s) and the reuse up to 17 mgd (750 L/s).

Table 2-11 shows the components of the potable water supply system proposed under Alternative 3, both in terms of the baseline infrastructure (i.e., existing potable water supply facilities) and proposed infrastructure (i.e. improvements proposed under Alternative 3), which together are planned to provide for future long-term potable water demands within the Master Plan study area.

The El Florido and Abelardo L. Rodríguez Water Treatment Plants will continue operating, after renovation, to treat water coming from the Colorado River with a capacity of 103 mgd (4,500 L/s).

Figure 2-4

Table 2-11
Potable Water Supply System for Alternative 3

Project	Water Source	Maximum Capacity (mgd / L/s)	Average operational flow (mgd/L/s)
Base Infrastructure:			
El Florido water treatment plant	Colorado River	91/4,000	91/4,000
Abelardo L. Rodríguez water treatment plant	Colorado River	11/500	11/500
Río Alamar/Río Tijuana aquifer wells	Tijuana/Alamar Aquifer	4/180	4/180
Monte de los Olivos water treatment plant	Aquifer Tijuana/Alamar	6/250	6/250
La Misión wells	La Misión wells	1/51	1/51
Proposed Infrastructure:			
Desalination Plant	Pacific Ocean	9 / 413	4 / 180
Aqueduct and Water Treatment Plant for water from the Colorado River	Colorado River	40 / 1,760	23 / 659
Microfiltration/reverse osmosis at La Morita and Monte de los Olivos (1) WWTPs	Effluent from La Morita and Monte de los Olivos WWTP	21 / 931	15 / 659
Microfiltration/reverse osmosis at Alamar Regional (1) WWTP	Effluent from Alamar Regional WWTP	10 / 420	5 / 210
New wells (Extraction of the aquifer recharge)	Alamar Aquifer	7 / 300	3 / 150
Water treatment plant for reuse flows from the Rodríguez reservoir	Effluent from the La Morita and Monte de los Olivos WWTPs	17 / 751	12 / 527
Total		**187 / 8,205**	**156 / 6,838**

The Colorado River aqueduct pipeline will be approximately 377,295 ft (115 km) long with a diameter of 40 in (102 cm), and is proposed to follow the alignment of the existing Colorado River Tijuana aqueduct, which lies entirely within Mexico. The average distance of the aqueduct from the U.S. border is 5,000 feet - 10,000 feet (1,524 m – 3,048 m).

Similar to Alternatives 1 and 2, a number of pump stations and conveyance pipelines would be required for Alternative 3, most of which would be new although some of the improvements would occur as renovation of existing facilities. Table 2-12 summarizes the general nature and size of the main infrastructure improvements associated with the potable water system under Alternative 3.

Table 2-12
Infrastructure Improvements Related to Potable Water Supply System Improvements Under Alternative 3

Nature of Improvement	Description
Conveyance of effluent from La Morita WWTP to Monte de los Olivos WWTP (1)	Provision of 1,900 horsepower (hp) of pumping capacity through approximately 21,342 feet (6,505 meters (m)) of new pipeline that is approximately 30 inches (76 centimeters (cm)) in diameter.
Conveyance of advanced treated effluent from Monte de los Olivos WWTP to Abelardo L. Rodríguez Reservoir	Provision of 1,144 hp of pumping capacity through approximately 30,180 feet (9,199 m) of new pipeline that is approximately 24 inches (61 cm) in diameter.
Conveyance of advanced treated effluent from Alamar Regional WWTP to the groundwater injection well site(s) for aquifer recharge	Provision of 1,206 hp of pumping capacity through approximately 7,238 feet (2,206 m) of new pipeline that is approximately 24 inches (61 cm) in diameter.
Seawater pipeline to new desalination plant	Provision of approximately 6,398 feet (1,950 m) of new pipeline that is approximately 84 inches (213 cm) in diameter.
Storage Tanks to Store Treated Potable Water	Thirteen new storage tanks with capacities ranging from approximately 0.13 to 5.3 million gallons (MG)(500 to 20,000 cubic meters (m^3).
Water Mains	Provision of approximately 294,159 feet (89,660 m) of new water mains with diameters from 12 in (30cm) to 60 (152 cm)
Pumping Plants	Provision of 10 pumping plants with capacities ranging from 100 to 7,200 hp
Potable Water Supply Pipelines to Increase Service Coverage	Provision of 885,863 ft (270,012 m) of potable water supply pipelines with diameters ranging from 4 in (10 cm) to 18 in (46 cm)
Supply Pipelines from Primary Network to Areas of Future Growth	Provision of 4,659,159 ft (1,420,116 m) of potable water supply pipelines
Renovation of Existing Supply Pipelines	The renovation of 812,326 in (247,598 m) of supply pipelines that are in poor condition.

1 The secondary effluent from La Morita for reuse will be sent to Monte de los Olivos, where the process of microfiltration / reverse osmosis will take place for the secondary effluent from both plants.

It is important to note that although the general nature and size of the infrastructure improvements described in Table 2-12 can be, and have been, estimated for the purpose of the Master Plan, the exact nature, size, and location / alignment of such improvements is not known at this time. Such information would be determined in conjunction with future more detailed design and evaluation of the selected alternative.

Sanitation System Improvements:
The components of the sanitation system for Alternative 3 would be identical to those shown in Alternative 2.

2.5 No Action Alternative

NEPA requires the No Action alternative to be used as a baseline by which the impacts of the other alternatives are compared. The existing Tijuana and Rosarito Potable Water System, shown in Table 2-13, consists of two aqueducts, two reservoirs, two water treatment plants, several groundwater wells, and a distribution system divided into conveyance lines, supply distribution pipelines, storage tanks, small pumping stations, and chlorination systems.

The primary sources of water in the study area are: (1) the Colorado River, which provides approximately 94.5 percent of the water; (2) the Río Tijuana / Alamar aquifer; (3) La Misión Aquifer; (4) the Rosarito Aquifer (currently out of commission due to saltwater intrusion); and (5) surface-water runoff captured in the El Carrizo and Abelardo L. Rodríguez Reservoirs. CESPT has plans to provide an additional 29.6 mgd (1300 l/s) of water through expansion of the existing Colorado River Tijuana aqueduct. The exact nature, extent, and location of future improvements to the existing aqueduct have not yet been determined.

As shown in Table 2-14, the current treatment capacity of Mexico's wastewater treatment system is approximately 44 mgd. Under the No Action Alternative, Mexico will construct 4 WWTP with Japanese Credit funds, and will continue to operate its existing system (as described in Section 1.8) with a minor increase in treatment capacity. Through improvements in existing plants and the construction of the 4 Japanese Credit WWTPs, the total future projected capacity in 2005 will be approximately 85 mgd. Based on flow projections, treatment demand will begin to exceed treatment capacity by 2013, and by 2023, the treatment deficit will reach 36 mgd.

Table 2-13 Potable Water Infrastructure for No Action Alternative			
Project	**Water source**	**Maximum Capacity (mgd / L/s)**	**Average operational flow (mgd/L/s)**
Baseline Infrastructure			
El Florido water treatment plant	Colorado River	91 / 4,000	91 / 4,000
Abelardo L. Rodríguez water treatment plant	Colorado River	11 / 500	11 / 500
Río Alamar/Río Tijuana aquifer wells	Tijuana/Alamar Aquifer	4 / 180	4 / 180
Monte de los Olivos water treatment plant	Tijuana/Alamar Aquifer	6 / 250	6 / 250
La Misión wells	La Misión Aquifer	1 / 51	1 / 51

Table 2-14 Baseline Infrastructure and Sanitation Projects for No Action Alternative		
Project	**Locations served**	**Average Capacity (mgd/L/s)**
Base Infrastructure:		
International Plant	Tijuana	25 / 1,100
San Antonio de los Buenos	Tijuana	25 / 1,100
Rosarito I	Rosarito	1 / 50
Crédito Japonés plants:		
La Morita	Tijuana	9 / 380
Monte de Los Olivos	Tijuana	10 / 460
Tecolote-La Gloria	Tijuana	9 / 380
Rosarito II	Rosarito, Tijuana	5 / 210

2.6 Common Elements to all the Alternatives

In addition to the development of the project alternatives, the draft Master Plan identified a list of recommended actions and studies to improve the infrastructure, operational and institutional capabilities of CESPT. These recommendations are pertinent to the No Action Alternative as well as Alternatives 1,2, and 3.

- Expansion of water and wastewater distribution systems
- Cleaning, inspection and improvement of the sewage system
- System improvement and leak reduction
- New users hook-up program
- Industrial and commercial discharge control program (Pre-treatment)
- Pumping stations evaluation and improvement
- Restroom facilities control program
- Separation of the sanitary and stormwater sewage systems
- Waste collection from septic tanks
- Improvements to the operation and maintenance programs of treatment plants
- Feasibility study of water reuse for non-potable purposes (industrial, green areas)
- Study for management of sludges from treatment plants (including reuse)
- Discharge into the ocean beyond the surf zone (Ocean Outfall)

- Study on aquifer recharge with high quality effluent
- Study on the optimization of water plants
- Study for the management of the Abelardo L. Rodriguez Dam basin
- Remote monitoring of water distribution and sewage systems (Telemetry)
- Rate study
- Metering Program

2.7 United States Public Law Plant

On November 6th, 2000, the United States Congress enacted Public Law 106-457 Act, Estuaries and Clean Waters Act of 2000, which President Clinton signed into law. Title VIII, entitled Tijuana River Valley Estuary and Beach Cleanup, states that subject to the negotiation of a new treaty minute, the United States International Boundary and Water Commission (USIBWC) is authorized to take the necessary measures to provide secondary treatment in Mexico of up to 50 million gallons per day (mgd) (2,190 l/s) of: 1) 25 mgd (1,090 l/s) of advanced primary effluent of the International Wastewater Treatment Plant (IWTP) and 2) of additional wastewater generated in Mexico. Additionally, the Public Law plant could provide 25 additional mgd (1,090 l/s) of secondary treatment in Mexico subject to the results of the comprehensive plan. The secondary effluent from the Public Law facility could be reused in Mexico or the United States (after additional treatment) or discharged through the San Diego South Bay Ocean Outfall. Under the Public Law, the facility would be a privately constructed and owned wastewater treatment facility located in Mexico, which would then be financed under a twenty-year contract with the USIBWC. This contract would allow the owner of the facility to recover the costs associated with the development, financing, construction, and operation and maintenance of the facility.

The Public Law also directs the USEPA to develop the comprehensive plan with stakeholder involvement to address transborder sanitation problems in the San Diego-Tijuana border region. As stated above, the only determination that the master plan will make with respect to the Public Law facility is whether the facility should provide capacity in addition to the 50 mgd identified in the Public Law. The master plan will not assess the feasibility of the Public Law facility, as that determination is given to the USIBWC and Mexico under the Public Law. It is also important to note that the Public Law does not provide specific details on a significant number of infrastructure-related characteristics of the Public Law facility (e.g. the location of the plant). For this reason, the master plan has made a series of assumptions in this regard. These assumptions, regarding infrastructure characteristics and cost allocation, are presented in Appendix P of the draft Master Plan. It should also be noted that these assumptions were made only for purposes of the master plan and do not foreclose specific treatment technologies, locations, or other characteristics of a Public Law facility which may be subsequently agreed upon.

Thus, the draft master plan, which includes an analysis of the long term water and wastewater needs of the region, has identified options to meet those needs and made recommendations for preferred options for additional sewage treatment capacity for present and future flows.

As presented in sections 9 and 12 of the draft Master Plan, regarding the Public Law facility, the master plan determined if the size of the Public Law facility should be greater than 50 mgd (and up to 75 mgd). The master plan also analyzed all of the top-ranked alternatives with and without the Public Law facility. In other words, the master plan has the flexibility for any Public Law facility that is implemented by the USIBWC and Mexico to be substituted for the Mexican facilities that will be included in the recommended alternatives.

The Public Law Facility could be implemented under any of the three EA alternatives. This analysis is based on the assumption that the Public Law facility would be constructed in an area close to the Alamar river, in the same general area as the Alamar facility included in for Alternatives 1,2, and 3.

Wastewater Treatment:

The wastewater components of Alternatives 1,2, and 3 would be the same under the Public Law scenario. The reasons for that are:

In the original wastewater alternatives without the Public Law facility, Alternatives B and E differ only in that alternative E expands La Morita WWTP, reducing the size of the Alamar plant from 1470 l/s to 980 l/s.

Under the Public Law facility scenario, CESPT should maximize the benefits of the financing of the Public Law facility. Thus, instead of the expansion of La Morita, Alternatives 2 and 3 would expand the Alamar plant to the full capacity of 2,570 l/s (59 mgd). This would make Alternatives 2 and 3 equal to 1.

2.8 Existing and Proposed Effluent Discharge Methods

As previously discussed, three effluent discharge options were considered for the Master Plan, including: (1) coastal discharge in Mexico; (2) ocean outfall in Mexico; and (3) ocean outfall in the United States via the SBOO. Existing and possible discharge methods for base sanitation infrastructure and possible discharge methods for proposed sanitation infrastructure are presented in Table 2-15.

Table 2-15
Effluent Disposal Options for Existing and Proposed WWTPs

	Effluent Disposal Option

Project	SBOO	Coastal Discharge Mexico	Ocean Outfall in Mexico
Base Infrastructure:			
South Bay International Wastewater Plant	EE		
San Antonio de los Buenos		EE	PE
Rosarito I		EE	
Japanese Credit Plants:			
La Morita	PE	PE	PE
Monte de Los Olivos	PE	PE	PE
Tecolote-La Gloria		PE	PE
Rosarito II		PE	
Proposed Infrastructure:			
Alamar Regional	PE	PE	PE
Rosarito I Expansion		PE	
Popotla		PE	
Mesa del Descanso		PE	
Puerto Nuevo		PE	
La Misión		PE	
EE = Existing Effluent Disposal Method PE = Possible Effluent Disposal Method			

Section 3
Environmental Setting

3.1 General Overview

The overall environmental setting of the border study area is mainly characterized by the highly urbanized portions of Tijuana that extend fully to the international border, across which lies a combination of industrial uses, agriculture, rural and open space uses within the U.S. To the east of the Tijuana urban core are a combination of industrial and airport uses, as well as open space and rural uses. Topographic features include the relatively flat alluvial plain of the Tijuana River with tributary canyons and hillsides extending up into Mexico, and diverse topography extending eastward into the Otay Mesa area. The Tijuana River and the Pacific Ocean are the most notable hydrologic features of the area. Biological resources range from the diverse flora and fauna of the Tijuana River estuary, to scrub habitats adjacent to, and eastward of, the estuary, to developed / disturbed areas. Climate and meteorological influences include the cool semiarid steppe climate of the area with warm dry summers, mild winters, and ocean breezes. The air quality is generally characterized as being fair to good, although the San Diego Air Basin is in nonattainment with federal standards for ozone.

3.2 Air

3.2.1 Area of Influence

The area of influence for this project would, in general, include the San Diego Air Basin (SDAB), although only those areas directly adjacent to the international border would be subject to potential localized air quality impacts such as related to dust or odors.

3.2.2 Existing Conditions

Climate and Meteorology

The climate in San Diego County is influenced by the Pacific Ocean and its high-pressure systems, which result in dry, warm summers and mild, occasionally wet winters. The normal wind pattern throughout the County is predominantly westerly to northwesterly (i.e., blows predominantly towards the east and southeast) (City of San Diego Metropolitan Wastewater Department (MWWD), 1996). This pattern is occasionally disrupted by the Santa Ana wind conditions, during which offshore winds blow pollutants out to the ocean, resulting in clear days. If the Santa Ana conditions are combined with a low pressure system in Baja California, a pollutant laden air mass is drawn southward from Los Angeles and Orange Counties to produce some of the highest levels of air pollution found in the SDAB (MWWD, 1996) (CH2M HILL, 1998).

During the winter, afternoon temperatures vary from 60 °F to 80 °F, summer temperatures range from 80 °F to 100 °F. The average annual precipitation in the area is 9.5 inches, falling predominantly from November-April. (MWWD, 1996) (CH2M HILL, 1998).

Air Quality

Ambient Air Quality Standards

The federal Clean Air Act (CAA) of 1970 and the CAA Amendment in 1977 required the adoption of national ambient air quality standards (NAAQS) for sulfur dioxide (SO2), carbon monoxide (CO), nitrogen dioxide (NO2), hydrocarbons (HC), ozone (O3), particulates of less than 10 microns in size (PM-10) and lead (Pb). In addition, the State of California, Air Resources Board (ARB), has established state standards, which are generally more restrictive than the NAAQS, and has included sulfates, hydrogen sulfide (H2S), vinyl chloride, and visibility reducing particles (Table 3-1).

Table 3-1
State and Federal National Ambient Air Quality Standards
Maximum Concentration Averaged Over Specific Time Period

Pollutant	State Standard	Federal Standard
Oxidant (Ozone)	0.09 ppm (180 ug/m ^{3}) 1hr	0.12 ppm (235 ug/m ^{3}) 1hr
Carbon monoxide	9.0 ppm (10 mg/m ^{3}) 8hr	9.0 ppm (10 mg/m ^{3}) 8 hr
Carbon monoxide	20 ppm (23 mg/m ^{3}) 1hr	35.0 ppm (40mg/m ^{3}) 1hr
Sulfur dioxide	0.04 ppm (105 µg /m ^{3}) 24hr	0.03 ppm (80 µg /m ^{3}) annual average
Nitrogen dioxide	0.25 ppm (470 ?g/m ^{3}) 1hr	0.053 ppm (100 ?g/m ^{3}) annual average
Lead	1.5 µg/m ^{3} 30-day average	1.5 µg /m ^{3} calendar quarter
Suspended particulate matter (PM10)	50 µg /m ^{3} 24 hr 20 µg /m ^{3} Annual Arithmetic Average	150 µg /m ^{3} 24 hr* 50 µg /m ^{3} Annual Arithmetic Average**

Source: CH2M HILL, 1998 originally from State of California, 1994.
* Not to exceed 150 ?g/m ^{3} for a three year average
** Not to exceed 50 ?g/m ^{3} for a three year average

Current Conditions

A common expression of ambient air quality is the number of days air pollution levels exceed the federal and state standards shown in Table 3-1. The annual number of days that the state and federal ambient air quality standards were exceeded in the SDAB during the time period of 1997 – 2001 is displayed in Table 3-2.

Table 3-2 Summary of Air Quality Data for the San Diego Air Basin						
Pollutant		**Number of Days Over Standard**				
		1997	1998	1999	2000	2001
Ozone	Federal	0	0	0	0	0
	State	10	0	1	2	10
Carbon Monoxide	State and Federal	0	0	0	0	0
Sulfur dioxide	State and Federal	0	0	0	0	0
Nitrogen dioxide	State and Federal	0	0	0	0	0
Lead	State and Federal	**	**	**	**	**
Particulates (PM10)*	Annual Arithmetic Average ($\mu g/m^3$)	47	43	52	46	49
	Highest 24-Hour Concentration	0	0	0	0	0

Source: San Diego Air Pollution Control District (SDAPCD, 2002.
** Data not available, however, SDAB is designated as an attainment area for lead (SDAPCD, 2002).

Ozone

Ozone is produced as the end result of a chain of chemical reactions that produce a photochemical smog from hydrocarbon emissions. This, combined with climatological and meteorological factors, have made it difficult to control ozone concentrations in the SDAB. As a result, the SDAB currently has a state and federal designation of a “serious” non-attainment area for ozone (CH2M Hill, 1998). However, there have been significant reductions in ozone concentrations in the SDAB in recent years and the San Diego Air Pollution Control District (SCAPCD) has applied to the EPA for a redesignation to attainment status for ozone. A decision is expected in 2003 (SCAPCD, 2002).

Particulates

The SDAB is in attainment with the federal standards for particulates (10 microns or less), but is currently listed in non-attainment status with the state (CH2M HILL, 1998). The state standards have been difficult to meet due to natural particulate matter sources and the area’s dry climate (SCAPCD, 2002).

Local air pollution sources from within the area of influence (i.e., noise from sources within the United States) include vehicular air pollution on Interstate 5 and the more developed pockets along the border such as around the border crossing, and aircraft operations associated with Brown Field and the Imperial Beach Naval Auxilary Landing Field, and general urban activities within.

3.3 Surface Water

3.3.1 Area of Influence

Within the United States, the geographic area containing surface waters that may be potentially affected by the proposed project is limited. As shown previously in Figure 1-3, only one hydrologic basin (the Tijuana River) drains directly into the U.S.. Both the U.S. and Mexico have signed treaties in which Mexico has agreed to intercept the flow of the Tijuana River during the dry season for its eventual transport to either one of two wastewater treatment plants. During the rainy season, however, the Tijuana River flow is allowed to continue into the United States and to discharge into the estuary, whenever the flows exceed 11.4 mgd (500 l/s).

The Pacific Ocean along the coast of San Diego is also considered to be a surface water within the area of influence of the proposed action. Development of the Alamar WWTP proposed under all three of the build alternatives includes the option of disposing of effluent through the existing South Bay Land Outfall, which discharges into the Pacific Ocean through the South Bay Ocean Outfall. The Japanese Credit plants La Morita and Monte de los Olivos would also dispose effluent through the South Bay Ocean Outfall.

3.3.2 Existing Conditions

Tijuana River

Tijuana does not have permanent rivers and the principal intermittent stream is the Tijuana River, which originates in Sierra de Juárez and flows southeast-northwest eventually flowing into the Pacific Ocean, in territory belonging to the United States via the estuary of the Tijuana River. The main tributary streams of the Tijuana River are the Tecate/Alamar River and the streams of Hechicera, Calabazas and Palmas.

The Tijuana River receives the city of Tecate's wastewater (most of it already treated), consequently flows within the Tecate River influence the quality and quantity of the water in the Tijuana River. The Tecate treatment plant has historically had effluent quality problems; however, the treatment plant is currently being renovated. Surface wastewater runoff from the city of Tijuana can also affect the quality and quantity of water in the Tijuana River, whether this is from colonias (neighborhoods) that lack sewer service or from spills resulting from blockages or collapsed pipes.

Both countries have signed treaties in which Mexico has agreed to intercept the flow of the Tijuana River during the dry season for its eventual transport to either one of two wastewater treatment plants (Refer to Minute 270, International Boundary and Water Commission, http://www.ibwc.state.gov). During the rainy season, however, the Tijuana River flow is allowed to continue into the United States, affecting the water quality of the Tijuana River in the United States and U.S. coastal waters. Several studies have been conducted to evaluate the water quality of the Tijuana River estuary. These concluded that although sewage containing heavy metals has continued to flow into the river, elevated levels of only cadmium were found in the sediments of the Tijuana River. Additionally, this study noted that only lead was found in levels above an international standard in fish (neither of which pose a significant public health risk) (CH2M HILL, 1998).

The Pacific Ocean

Ocean water quality in the vicinity of the international border is affected by surface runoff that flows to the ocean and by discharges from wastewater plants. The San Antonio de Los Buenos Wastewater Treatment Plant, located approximately 9 miles (15 km) south of the border, discharges a combination of treated wastewater and chlorinated raw wastewater directly in the ocean. It has been posed that the coastal currents in the region sometimes move from south to north (see description below), creating the possibility that some discharges from the San Antonio de Los Buenos Wastewater Treatment Plant affect the quality of the water in the San Diego Bay in the United States.

The IWTP is located in San Diego and treats wastewater from Tijuana at an “advanced primary” level. The IWTP discharges into the bay through an underwater ocean outfall pipe (i.e., the South Bay Ocean Outfall – SBOO), which helps to dilute effluent entering the ocean and to reduce environmental impacts. However, this plant does not meet U.S. quality standards on several parameters, among them toxicity. There are plans to provide secondary level treatment, although to date the type of technology to be used and the location of the secondary treatment module is still undecided. Finally, the Point Loma Wastewater Treatment Plant, located at the far north end of the bay, discharges advanced primary effluent into the Pacific Ocean.

The currents found along the coast of California are controlled mainly by the offshore, southward-flowing California current, which consists of a (1) broad southerly current that flows near the edge of and beyond the continental shelf, (2) and undercurrent flowing northerly under the southern current, and (3) coastal countercurrents flowing northerly at the surface and near surface (Figure 3-1) (Recon, 1994). The California current varies in position and intensity based on the season, shifting onshore during the spring and summer. The northward flowing countercurrent is found at a depth of 90 feet and flows from Baja California to northern California, bringing warm, high salinity Equatorial Pacific water. There is an equatorial coastal flow that occurs with the northerly undercurrent from early spring to fall caused by wind stresses. Once the wind stresses subside (September) a broad northward surface current called the Davidson current begins to develop approximately 62 miles offshore. The dynamics of the flows are influenced by the interactions of the coastal currents within the California system and the seasonal upwelling events that bring cool, dense water to the surface (Recon, 1994).

Modeling of the flow patterns found the principal pattern to be a relatively uniform longshore flow north and south along the coastline, and a recurring eddy with counterclockwise circulation south of Point Loma of varying intensity found anywhere from 6.2 to 9.3 miles offshore and roughly 10.6 miles alongshore (CH2M HILL, 1998).

Marine Water/Sediment Quality

The City of San Diego performs monthly compliance monitoring for the SBOO. The sampling area extends from the tip of Point Loma southward to Punta Bandera, Baja California, Mexico, and from the shoreline seaward to a depth of 200 ft.

Monthly mean data for water temperature, salinity, density, pH, transmissivity, dissolved oxygen (DO), chlorophyll a and suspended solids are presented in Table 3-3 (City of San Diego, 2002).

Table 3-3
Monthly Mean Values of Selected Water Quality Parameters during 2001

Month	Temp (°C)	Density ???	Salinity (ppt)	D.O. (mg/L)	pH	Chlor (?g/L)	TSS (mg/L)
Jan	14.4	25.00	33.58	7.9	8.0	6.71	4.9
Feb	13.3	25.20	33.55	7.9	8.0	10.71	4.7
Mar	13.8	25.06	33.48	7.7	8.0	6.40	7.1
Apr	12.4	25.40	33.59	6.6	7.9	9.27	4.6
May	12.8	25.32	33.59	7.0	8.1	7.57	4.2
Jun	12.5	25.40	33.64	7.3	7.9	8.96	4.0
Jul	14.8	24.89	33.58	7.9	8.1	13.35	11.0
Aug	13.3	25.21	33.59	7.1	8.1	6.82	4.8
Sep	13.6	25.12	33.54	7.6	8.0	9.66	5.4
Oct	15.1	24.78	33.53	8.0	8.0	7.44	5.2
Nov	14.4	25.00	33.53	7.7	8.0	8.49	4.8
Dec	13.9	25.09	33.56	7.7	8.1	8.90	9.9

Source: City of San Diego, 2002

Results of this study showed that physical and chemical parameters reflect a seasonal pattern. During the winter, increased surf and wind conditions result in a mixed water column with little thermal stratification. Around April, conditions change due to an intrusion of cold water followed by a warming of surface waters, causing the water column to become well stratified. Summer and fall were marked by a shallow, seasonal thermocline most pronounced between 13 and 30 ft (City of San Diego, 2002).

The water quality in the vicinity of the SBOO was a result of both oceanographic events and input from point and non-point anthropogenic sources. Physical and chemical parameters were largely affected by stormwater inputs and oceanographic conditions (City of San Diego, 2002).

Sources of bacterial contamination found along the shoreline adjacent to the SBOO include the Mexican sewage treatment plant discharges at the Canyon San Antonio de los Buenos Creek outlet, input from the Tijuana River, and coastal storm drain outlets. The coliform concentrations found offshore were highly variable and ranged between 6 and 4,070 CFU / mL (City of San Diego, 2002). The City of Imperial Beach regularly monitors for bacterial contamination. Beaches in the vicinity were closed due to bacterial contamination and sewage flows from the Tijuana River for a total of 26 days in 2001 (Dept. of Environmental Health, 2001).

Insert Figure 3-1

The waste field from the SBOO typically remains offshore and at depth, due to the stratification found during most of the year. The plume does surface occasionally under non-stratification conditions. Due to the numerous anthropogenic inputs, it is difficult to make a clear distinction between water quality changes caused by the SBOO and other sources. In general, shoreline sources of contamination tend to impact the nearshore waters, while monitoring results from the City of San Diego 2001 study suggest that discharge from the SBOO does not impact the shoreline and remains at the bottom near the diffuser (City of San Diego, 2002).

Sediments surrounding the SBOO were generally found to be fine sands with a mean particle size of 2.3 phi *(phi = -*log_2 *(size in mm))*. Higher concentrations of most trace metals and organic compounds were found in finer sediments, but those concentrations found near the SBOO were low when compared to the entire southern California continental shelf. Aluminum, chromium, copper, iron, manganese, zinc, and arsenic were found at all stations. Other contaminants were seen only occasionally; derivatives of the chlorinated pesticide DDT were detected at three monitoring stations, and PCB compounds were present at one station (City of San Diego, 2002).

3.4 Ground Water

3.4.1 Area of Influence

Although there is a groundwater basin known to straddle the international boundary between the U.S. and Mexico, there is little information available regarding the exact extent and characteristics of the aquifer and associated groundwater quality, quantity, and flow. As such, it is difficult to estimate what the area of influence might be.

3.4.2 Existing Conditions

Groundwater in the lower Tijuana River Valley occurs in the following three zones: (1) beneath Nestor Terrace north of the valley, (2) in the alluvial fill underlying the Tijuana River valley, and (3) in the San Diego Formation beneath the alluvium. Of the three, the alluvium fill has been most used and studied (CH2M HILL, 1998). The aquifer in this area is unconfined and can potentially store up to 65,000 acre-feet of water. The aquifer rests atop a bedrock surface and, on the average, consists of 50 to 90 feet of sand and silt overlying 10 to 35 feet of interbedded layers of gravel and sand, which are tapped by production wells (MWWD, 1996). The aquifer is recharged primarily by direct rainfall, subsurface inflow from adjacent areas, and intermittent flood flows (Recon, 1994).

Historically, groundwater consumption was related to potable water extraction for export and agricultural use. The high levels of pumping during the 1950s resulted in a lowering of groundwater levels of 23-30 feet. By the 1960's, groundwater levels had dropped below sea level, allowing highly saline groundwater and seawater to flow into the water (Recon, 1994).

Several factors, including imported irrigation water, reduced pumping due to degraded groundwater quality, and the abandonment of farming activities have contributed to the decline in groundwater usage since 1952 (MWWD, 1996). This has allowed groundwater levels to recover to within 0 to 15 feet of the ground surface (CH2M HILL, 1998). There is currently no known extraction of groundwater from the Tijuana River basin for any purpose except limited agricultural use (MWWD, 1996).

Currently, the quality of groundwater in the basin is characterized by high levels of total dissolved solids and sodium chloride, which prevents the use of well water for salt-sensitive crops. It has been rated generally inferior for domestic use due to high sulfate and fluoride concentrations. In addition, it was rated inferior for irrigation purposes because of high electrical conductivity, high chloride levels, and a high percentage of sodium. Several factors besides seawater intrusion have attributed to the poor quality of groundwater in the Tijuana River valley, including leakage from the San Diego formation, sewage from the community of San Ysidro, irrigation return, and groundwater movement from the international boundary (Recon, 1994).

3.5 Biological Resources

3.5.1 Area of Influence

There are three levels of area of influence related to biological resources. The first level relates to the potential for direct impacts to biological resources from construction of the effluent line that will connect to the SBLO, which extends approximately 1,500 feet (457 m) into the U.S.. The second level relates to the potential for indirect impacts from construction activities in Mexico that occur near biological resource areas within the Tijuana Estuary. The third level of impact relates to the potential for direct or indirect impacts to migratory bird species.

3.5.2 Existing Conditions

Biological Resources Along Effluent Pipeline Route Within U.S.

The subject pipeline segment route would follow the alignment of Old Dairy Mart Road, which is devoid of any native vegetation. The area to the east of the pipeline route is occupied by a combination of disturbed habitat and the existing SBIWTP, and the area to the west is occupied by disturbed habitat and light industrial uses. No patches of native vegetation occur within the subject area (CH2M Hill, 1998). Sensitive plant species found in the general vicinity include San Diego barrel cactus, San Diego marsh-elder, ashy spike-moss, and San Diego sunflower; however, the pipeline alignment and adjacent areas are highly disturbed or developed and no sensitive plant species and known to occur therein. Sensitive wildlife observed in the general vicinity include least Bell's vireo, coastal California gnatcatcher, black-shouldered kite, northern harrier, red-tailed hawk, red-shouldered hawks, and Caspian tern. None of these animal species is expected to nest at, or near, the subject alignment because of the disturbed / developed nature of the area and resultant lack of suitable habitat.

No wetlands occur along or near the pipeline alignment.

Biological Resources Within Tijuana Estuary

Portions of the Tijuana River Valley, as it extends west from the international border to the Pacific Ocean support a variety of biological resources. For the most part, the portion of the River Valley located between the international border and Dairy Mart Road is devoid of notable biological resources due to a combination of factors including the channelization of the Tijuana River in the eastern portion of this segment, current development, and past and present agricultural and mining activities. Areas west of Dairy Mart Road and north of Monument Road include pockets of dense riparian habitat that support a variety of bird species and are high in habitat value. The subject area is interspersed with agricultural, equestrian, mining, and rural residential uses, but, overall, is still rich in wildlife values. The most notable area of biological resources is the Tijuana Estuary, which extend east from the Pacific Ocean to approximately 19th Street.

The Tijuana Estuary is part of the National Estuarine Research Reserve (NERR) System and is classified as a Coastal Plain Estuary. The eastern boundary of the Tijuana River NERR is 19th Street, which is approximately 1.7 miles ((2.7 km) northwest of the proposed Alamar WWTP effluent pipeline connection to the SBLO. Several different habitats occur within the Estuary including, but not limited to, sand dunes and beaches, open tidal channels and mudflats, salt marshes (low, middle, and high); fresh-brackish marshes dominated by bullrushes and cattails, and upland riparian habitats. The Estuary includes cordgrass, pickleweed, saltwort, shoregrass, and the endangered salt marsh bird's beak. The estuary also is home to more than 370 species of birds, of which about 320 are migratory, included four federally listed endangered birds: the light-footed clapper rail, the California least tern, the least Bell's vireo, and the California brown pelican. Occasional visitors include peregrine falcons, bald eagles, and golden eagles. The Estuary is used for staging and wintering by a variety of waterfowl and shorebirds, with more than 20 species occurring regularly along the sandflats and mudflats. The Estuary also supports a small mammal population, including mice, California ground squirrels and rabbits. At least 20 species of fish reside in the small tidal creeks and channels of the estuary, and large populations of crabs, rove beetles, tiger beetles, and wandering skippers can be found, as well .

Along the western side of Dairy Mart Road there are several areas of southern cottonwood-willow riparian forest that are known to support breeding habitat for the least Bell's vireo, a state and federally listed endangered species (MWWD, 1996). Such breeding territory includes the area immediately north of the intersection of Monument Road and Dairy Mart Road, approximately 2,500 feet (762 m) west of the proposed Alamar WWTP effluent pipeline connection to the SBLO.

Habitat suitable for infrequent use by the California gnatcatcher, a federally listed threatened species, occurs south of the intersection of Monument Road and Dairy Mart Road (MWWD, 1996). Such habitat is approximately 2,500 feet (762 m) west of the proposed Alamar WWTP effluent pipeline connection to the SBLO.

Migratory Species

In conjunction with development of the MIA addressing potential environmental impacts in Mexico, 127 species of birds were identified as occurring on the Baja peninsula of Mexico, particularly in the general area of the Master Plan. Of these species, all except six are included on the list of migratory birds recognized by the U.S. Migratory Bird Treaty Act (MBTA). Of the 121 species, two are listed as threatened or endangered by the federal Endangered Species Act. Table 3-4 identifies the subject bird species. It is important to note that the list of species is representative of the total geographic region for the Master Plan area and, due to the conceptual nature of the proposed action at this time, is not specific to the vicinity of each of the major improvements proposed under the various alternatives.

3.6 Cultural Resources

3.6.1 Area of Influence

The only area of influence related to potential cultural resource impacts occurring within the U.S. is the area of the Alamar WWTP effluent pipeline that extends into the U.S. to connect with the SBLO.

3.6.2 Existing Conditions

Surveying and geotechnical monitoring were conducted on the Hofer property, which extend to the pipeline alignment, by Mariah Associates, Inc. in 1994. One prehistoric archaeological site was identified in a backhoe trench. The limited cultural materials that were recovered included a piece of thermally altered rock, a unidirectional core, and two metavolcanic flakes. The site's recorder stated that the existence of thermally altered rock was probably indicative of a buried hearth. The site was tested and found to lack intact cultural deposits and was in a redeposited, disturbed context. Mariah's test concluded that CA-SDI-13,486 was not eligible for the National Register (CH2M Hill, 1998).

The subject pipeline alignment is not within or near any tribal lands. It is not believed that there are any Indian Trust Assets in the general vicinity of the pipeline alignment. As part of the cultural resources evaluation completed in 1996 for the South Bay Water Reclamation Plant (SBWRP) and the Dairy Mart Road and Bridge Improvements project, situated west and northwest of the proposed pipeline alignment, a letter describing the proposed SBWRP / DMRBI projects was provided to the chairpersons of ten Indian bands in the San Diego County area explaining Indian Trust Assets (ITA) and asking if any band felt that the projects would have a direct or indirect impact on an ITA. No response was received. A second similar letter was subsequently distributed and, again, no response was received; suggesting that no ITAs occur in the general vicinity.

Insert Table 3-4 here

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3.7 Noise-

3.7.1 Area of Influence

The area of influence in respect to noise is limited to those areas in the U.S. that are immediately adjacent to the international boundary.

3.7.2 Existing Conditions

Existing Noise Environment

Based on the highly urbanized nature of Tijuana near the international border, the existing noise environment throughout much of the area immediately adjacent within the United States is characterized primarily by vehicular noise from car and truck travel, commercial aircraft noise from operations at the Aeropuerto de Tijuana, and general urban activities. Local noise sources from within the area of influence (i.e., noise from sources within the United States) include vehicular noise on Interstate 5 and local roads, aircraft operations associated with Brown Field and the Imperial Beach Naval Auxilary Landing Field, and general urban activities within the more developed pockets along the border such as around the border crossing stations. Ambient noise levels are estimated to range from approximately 45 decibels A-weighted (dBA) in remote undeveloped areas to over 70 dB near freeways and highly urbanized areas.

Sensitive Noise Receptors

Sensitive noise receptors typically include residential development, schools, hospitals, etc. Under certain conditions, habitat areas can also be considered to be sensitive receptors, such as when noise levels exceed 60 dBA in nesting areas for least Bell's vireo and California gnatcatcher during the respective breeding seasons.

In general, the presence of such receptors is limited to the western portion of the area of influence. Rural residential development occurs in and near the Tijuana River estuary. Residential subdivisions occur to the north of the Tijuana River between Dairy Mart Road and Interstate 5, as does a public school located southwest of the Interstate 5/Via de San Ysidro interchange. With the exception of areas immediately adjacent to Interstate 5, the area of influence east of Interstate 5 is generally undeveloped or is occupied by non-sensitive uses such as agricultural or industrial/business park development.

Noise Standards

There are established noise ordinances set by the City of San Diego that regulate construction and operation noise levels on specific types of land uses. Although these noise ordinances do not apply to activities occurring outside of the United States, they provide a reasonable basis for evaluating the significance of potential noise impacts associated with the proposed action. Ordinance 59.5.0404 states that construction noises may not exceed 75 decibels equivalent sound level (dB Leq) between 7:00 A.M. and 7:00 P.M. in residential areas. Operational noise levels (established in Ordinance 59.5.0401) vary by land use type, and are lower during the nighttime. Residential uses range from 45 dB Leq to 60 db Leq, commercial ranges from 60 dB Leq to 65 dB Leq, and industrial uses have a limit of 75 dB Leq (Recon, 1994).

The land use in most of the U.S. areas that are adjacent to where the proposed effluent line will be constructed is undeveloped or agricultural. There are small sections of industrial and public facilities/utilities land use near where the Tijuana River crosses the international border. In Mexico, the effluent line will cross areas of industrial and residential use (SDSU, 2000).

Section 4
Environmental Consequences

This chapter discusses the potential direct and indirect transboundary impacts to U.S. environmental resources resulting from Master Plan activities, which are anticipated to be less than significant.

4.1 Air Quality

4.1.1 No Action

Under the No Action alternative, Mexico will build the four Japanese credit WWTPs and may make improvements to existing WWTPs, however, none of these facilities are within close enough proximity for air emissions from construction or operation of the plants to have any effect on air quality in the U.S. Without the proposed Master Plan, Mexico may nevertheless undertake further improvements or additions to the existing water supply and sanitation system; however, the likelihood, nature, and location(s) of such improvements are currently unknown. It would be speculative to evaluate the potential impacts of such potential projects.

4.1.2 Alternative 1

The majority of the proposed water and wastewater infrastructure in Alternative 1 is not located in close enough proximity to have any potential impact on air quality in the U.S. The possible exceptions to this would be the construction and operation of the proposed Alamar WWTP and the effluent disposal option that proposes construction of a pipeline that will extend into the U.S. to connect with the SBLO.

Site preparation and construction activities would result in the emission of sulfur oxides, nitrogen oxides, hydrocarbons, carbon monoxide, and particulate matter from equipment exhaust, and particulate matter from fugitive dust. These emissions would be generated from earthwork activities (i.e., grading, trenching / excavation, filling, etc.) and from major hauling operations, if necessary, to remove excavated material or to bring in supplies. Of particular potential concern would be nitrogen oxide (NOx) emissions, which are a precursor to ozone and are associated with diesel engine exhaust. Construction activities are temporary and the associated emissions would tend to disperse towards the southeast, away from the United States, based on the prevailing wind patterns of the area. Additionally, the construction activities occurring nearest to, or within, the U.S. boundary would be limited to the installation of an effluent pipeline that will connect to the SBLO. The nature of this type of construction activity (i.e., excavation for, and placement of pipeline segments along a linear corridor) typically limits the number of construction equipment that are active at any given time. As such, no significant transboundary impacts are expected to occur from Alternative 1 construction-related air pollutant emissions.

All of the proposed alternatives are only in the conceptual stage; therefore it is not possible to provide a detailed analysis of operations-related air quality impacts. Air emissions from a typical activated sludge plant include hydrogen sulfide, musty odors from the aeration basin biomass, and VOC emissions from the aeration basins. The anticipated location for the Alamar WWTP is approximately 9,850 feet (3 km) south of the international border, and prevailing winds would disperse the plant emissions in a southeasterly direction, away from the United States. As such, no significant transboundary impacts are expected to occur from Alternative 1 operations-related air pollutant emissions.

4.1.3 Alternative 2

Air quality impacts generated from Alternative 2 would be essentially the same as those discussed for Alternative 1. Although the size of the Alamar WWTP under Alternative 2 is smaller than that proposed under Alternative 1 (i.e., 22 mgd / 980 L/s compared to 44 mgd / 1,470 L/s), the construction-related and operations-related air quality transboundary impacts of the two scenarios would not differ in a material way.

4.1.4 Alternative 3

Air quality impacts generated from Alternative 3 would be essentially the same as those discussed for Alternative 1. Like Alternative 2, construction-related and operations-related air quality transboundary impacts would not differ from Alternative 1 in any material way.

4.2 Surface Water

4.2.1 No Action

Construction Impacts

Under the No Action Alternative, there would be no construction activities occurring in or near the U.S., and no significant surface water quality impacts would occur.

In general, the no action alternative fails to respond to the basic objectives, purpose, and need of the projects. The no action alternative would not (1) address the need for improvements in existing potable water, wastewater collection, and wastewater treatment infrastructure, (2) reduce the discharges of wastewater to the Tijuana River, the Alamar River, canyons, and the Pacific Ocean; and (3) encourage programs for water conservation over the long term.

Operational Impacts

The Japanese Credit plants that will start operation around the year 2005 could have potential surface water impacts. The Tecolote la Gloria and the Rosarito II plants will discharge their effluent in the coastal area. Tecolote la Gloria will discharge secondary effluent at a point just north of the current San Antonio de los Buenos plant discharge site. Rosarito II will discharge secondary effluent south of that point.

4.2.2 Alternative 1

Construction Impacts

Implementation of Alternative 1 may include construction of an effluent pipeline that will connect to the SBLO within the U.S.. Grading and excavation associated with pipeline construction may result in potential erosion and sedimentation impacts to surface water quality. Other pollutants commonly discharged from construction sites can include solid / sanitary wastes, fertilizers and pesticides (i.e., associated with landscaping or revegetation), oil and grease, concrete truck washout, construction chemicals, and construction debris. These types of area source discharges to surface water quality are regulated through the National Pollutant Discharge Elimination System (NPDES) Storm Water Program. Phase I of the NPDES Storm Water Program regulates non-residential construction activities that disturb five or more acres of land (i.e., a "large" construction activity area), and Phase II, which is currently going into effect, expands the regulatory program to include construction activities that disturb between one and five acres of land (i.e., a "small" construction activity area). Based on a pipeline construction corridor approximately 1,500 feet (457 m) long and 20 feet (6 m), and a 100' x 100' work area for the effluent pipeline that will connect to the SBLO, the total disturbed area would be approximately 0.92 acre (0.37 hectares). As such, the amount of surface disturbance would be less than the NPDES Storm Water Program General Construction Permit requirements for a small construction activity area. Development of construction plans and specifications at more detailed levels of planning and engineering for the proposed pipeline segment should include the preparation of a storm water pollution prevention plan (SWPPP) that specifies the best management practices (BMPs) to be implemented in order to control construction-related pollutants in storm water runoff.

Although construction within Mexico of the remaining portion of the effluent pipeline that will connect to the SBOO, or of a different effluent pipeline that extends through Mexico to the coast, would also pose the potential for surface water quality impacts, such impacts are anticipated to occur in proximity to the construction activity area and are not likely to result in significant transboundary impacts within the U.S..

Based on the limited extent of surface disturbance occurring within the U.S. and the proposed inclusion of a SWPP with BMPs for implementation during construction, no significant surface water quality impacts related to construction activities are anticipated to occur from Alternative 1.

Operational Impacts

Implementation of the alternatives proposed in the Master Plan is not anticipated to cause any significant effects on surface water resources in the U.S..

All of the three alternatives propose to discharge secondary effluent into the Pacific Ocean via the SBOO. An ocean water quality modeling analysis was performed to determine if the proposed alternatives would comply with the California Ocean Plan

(COP) standards (see Appendix A). Two previous models have been conducted regarding the effects of discharge on ocean water quality. The original model was conducted in 1996 by Parsons Engineering, Inc. to predict the impact from discharges of advanced primary effluent through the SBOO. In 1997, CH2M HILL conducted a model for the evaluation of secondary treatment options for wastewater discharge to the South Bay Ocean Outfall (SBOO) from the South Bay International Wastewater Treatment Plant (SBIWTP). Although different flows and effluent concentrations were used, the 1997 model heavily relied upon the methodology and findings of the original 1996 model. In the same vein the current analytical model, Effluent Discharge and Dispersion through the South Bay Ocean outfall (CDM, 2003), is an extension of the 1997 model using updated flows and effluent concentrations and similar methodologies. The following parameters were compared to COP standards: sedimentation, turbidity, dissolved oxygen, oil and grease, pH, coliforms, and COP Table B compounds. The subsequent discussion provides a summary of the analyses conducted for each of the major constituents.

The proposed effluent is considered to be secondary effluent with disinfection. Therefore, it is assumed that the total and fecal coliform concentrations, at the point of discharge, meet the COP requirements.

According to the 1997 model, the anticipated range of pH values in the raw influent range from 6.8 to 8.6. In the Interim Operation SEIS modeling, a pH value of 7.15 was used, based on measured values at San Diego's Point Loma outfall. Effluent pH range for Master Plan proposed flow may be assumed to be similar to the 1997 TM. Therefore the COP criterion range of 6.0 to 9.0 for the pH of an effluent should be easily met. In any case, the strong buffering capacity of seawater should resist any significant change in pH due to admixture—and dilution—of an effluent of different pH.

The COP requirements indicates that "the dissolved oxygen concentration shall not at any time be depressed more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding waste materials." The largest percent reduction predicted in ambient DO levels due to Master Plan discharges does not exceed 1.4 percent, which is in compliance with the COP requirement described above.

The proposed effluent is predicted to produce an accumulation of approximately 1 mm/yr of sediment on the seabed in the area surrounding the diffuser. The deposition rates fall off with distance from the diffuser. The predicted rate is lower than the threshold that could have any effects caused by direct burial, and is of the same order of magnitude considered as a natural sedimentation rate in this type of environment. Therefore, non-compliance with the COP is not anticipated.

Compliance with Table B concentrations were calculated using the same data set used in the 1997 model, which was based on raw wastewater concentrations from samples taken from the Emergency Connection in 1995 and 1996. The limiting concentration requirements were met for all Table B constituents for the protection of marine life. Due to the conceptual nature of the Master Plan, it is not feasible to perform toxicity testing for acute and chronic toxicity, however; based on the use of a secondary treatment system, compliance with COP effluent limitations is expected. The limiting concentration requirements were met for all constituents listed for the protection of human health (non-carcinogens). The limiting concentration requirements were met for all constituents listed for the protection of human health (carcinogens), with the exceptions of polynuclear aromatic hydrocarbons (PAHs) and DDT, which are both groups of compounds. In both cases, the COP defines the effluent limit as the sum of the individual species. During sampling, the majority of the species were not detected. However, when summing results, the detection limit was used to represent the non-detected species, resulting in artificially high total concentrations. When the concentrations of detected species were summed, the effluent limitations provided by the COP were not exceeded and are therefore considered insignificant.

The effluent discharge and dispersion model discussed above only addressed discharge through the SBOO, since this is the preferred effluent disposal option for flows from the Alamar, La Morita, and Monte de Los Olivos Plants. However, as discussed in Section 2, an ocean outfall in Mexico and a coastal discharge in Mexico were also considered in the Master Plan. An ocean outfall in Mexico would presumably produce water quality in the area surrounding the diffuser similar to that of the SBOO. As discharge from the SBOO was not predicted to cause any significant impacts, neither would an ocean outfall in Mexico be expected to cause an impact. This conclusion is reinforced by the fact that there would be significant dilution of the effluent between the discharge point and the international border. Since coastal discharges in Mexico would be at shallower depths and not subjected to the same currents of either ocean outfall options, there is the potential for transboundary impacts. However, this is not anticipated due to the dilution that would occur between the discharge points and the U.S. border. Should either of the disposal options in Mexico become the preferred method in the future, a supplemental environmental assessment may be necessary.

The remaining wastewater plants proposed in the Master Plan and the Japanese Credit plants will discharge directly to the coastal waters of Mexico. This is not anticipated to cause any transboundary impacts due to the distance of the discharges from the U.S. border and the low volumes of effluent that will be discharged.

4.2.3 Alternative 2

Construction Impacts

Construction-related surface water quality impacts associated with Alternative 2 are the same as described above for Alternative 1.

Operational Impacts

Operation-related surface water quality impacts associated with Alternative 2 are the same as described above for Alternative 1.

4.2.4 Alternative 3

Construction Impacts

Construction-related surface water quality impacts associated with Alternative 3 are the same as described above for Alternative 1.

Operational Impacts

Operation-related surface water quality impacts associated with Alternative 3 are the same as described above for Alternative 1.

4.3 Ground Water

4.3.1 No Action

Under the No Action alternative, a minimal amount of impervious area would be created by the Japanese Credit plants potentially causing a slight interference with groundwater recharge. Additionally, no groundwater extraction or injections are proposed under No Action. Alternatives 1, 2, and 3 described below include provisions to inject advanced treated effluent into the aquifer of the lower Tijuana River Valley, which currently has groundwater with high levels of total dissolved solids and sodium chloride. The treated effluent would be of quality superior to that of the existing groundwater, consequently providing the ability to improve groundwater quality. The No Action alternative would forego this potential beneficial impact to groundwater quality.

4.3.2 Alternative 1

Although a minor reduction in absorption rates could be expected due to an increase in impervious surfaces associated with construction of the proposed facilities, no long term adverse affects are anticipated on the groundwater basin capacity, recharge potential, or water quality.

Under Alternative 1, advanced treated (microfiltration and reverse osmosis) WWTP effluent is to be injected into the aquifer, and groundwater extraction wells located at downstream locations would withdraw groundwater for a hydrologic balance. Alternative 1 is not expected to present any significant adverse impacts to groundwater hydrology. Inasmuch as the injected advanced treated effluent is anticipated to be of a higher quality than the existing groundwater (as discussed in Section 3.4.2), implementation of Alternative 1 would result in a beneficial impact related to groundwater quality.

4.3.3 Alternative 2

Ground water quality impacts generated from Alternative 2 would be essentially the same as those discussed for Alternative 1. Although the size of the Alamar WWTP under Alternative 2 is smaller than that proposed under Alternative 1 (i.e., 22 mgd / 980 L/s compared to 44 mgd / 1,470 L/s), the amount of water to be injected into the aquifer would remain the same, resulting in a beneficial impact to groundwater quality.

4.3.4 Alternative 3

Ground water quality impacts generated from Alternative 3 would be essentially the same as those discussed for Alternatives 1 and 2. Although the size of the Alamar WWTP under Alternative 3 is smaller than that proposed under Alternative 1 (i.e., 22 mgd / 980 L/s compared to 44 mgd / 1,470 L/s), the amount of water to be injected into the aquifer would remain the same, resulting in a beneficial impact to groundwater quality.

4.4 Biological Resources

4.4.1 No Action

The only aspect of the No Action Alternative having the potential for transboundary impacts to biological resources pertains to the possibility of construction of the four new WWTPs impacting habitat of migratory bird species. The potential for such impacts would be comparable to that which is described below for Alternative 1.

4.4.2 Alternative 1

Biological Resources Along Effluent Pipeline Route within U.S.

Based on the disturbed/developed nature of the area at, and around, the WWTP effluent pipeline segment proposed to connect with the SBLO, direct impacts to biological resources would be less than significant.

Biological Resources Within the Tijuana Estuary

The only aspect of the proposed action having the potential to impact biological resources within the Tijuana Estuary is the construction of the WWTP effluent pipeline segment to the SBLO, should that effluent disposal option be implemented. Other improvements associated with Alternative 1 are sufficiently distant from the Estuary as to not result in a significant impact to the biological resources therein (see additional discussion below regarding migratory species).

The potential for the effluent pipeline segment to impact biological resources within the Tijuana Estuary would be limited to direct construction-related impacts. Two sensitive species with habitat nearest to the proposed effluent pipeline route connecting to the SBLO include the least Bell's vireo and the California gnatcatcher, both with habitat being approximately 2,500 feet (762 m) west of the pipeline route. No significant direct impacts to these species or their habitat are expected to occur from the proposed action. Although both species are considered to be sensitive to noise levels greater than 60 dBA during their respective breeding seasons, noise levels associated with pipeline construction activities ranging up to 87 dBA at 50 feet (15 m) would naturally attenuate (due to geometric spreading of sound) to approximately 53 dBA at 2,500 feet (762 m).

No significant dust impacts to the habitat for these sensitive species are expected to occur because the narrow lineal nature of the pipeline construction area (i.e., graded surface area would be relatively small) would generally limit the amount of dust generated. Moreover, the subject habitat is located upwind of, and a substantial distance from, the subject construction area.

Potential direct impacts to these sensitive species from lighting during nighttime construction activities, if any, would be less than significant. The areas at and around the subject pipeline route area are currently exposed to nighttime lighting from the nearby existing wastewater treatment plants and border patrol operations.

Migratory Species

While there are over 120 migratory bird species occurring within the region of the Master Plan improvements proposed in Mexico, it is not possible at a conceptual Master Plan level to determine which, if any, of the species will be impacted by development of those improvements. The siting, design, and site preparation/construction requirements of the Master Plan improvements would be determined at the more detailed planning stages of Master Plan refinement. The MIA completed for the proposed Master Plan recognizes that the most probable impacts to bird species occur in conjunction with activities that directly affect their habitat, particularly habitat used for reproduction and refuge as well as open water areas. The MIA further recognizes that Master Plan facilities occurring at sites within river valleys such as at the Alamar River and Mision River have the greatest potential for affecting birds (i.e., riparian and densely vegetated areas providing desirable habitat for many bird species). As a measure recommended to avoid impacts to birds, the MIA identifies the need for the future planning, design, and additional environmental analysis of each specific infrastructure project to carefully consider the factors presented above.

To a similar, if not greater, degree, the future planning, design, and NEPA analysis of specific infrastructure improvements contemplated by the Master Plan will need to more accurately assess the potential for transboundary effects related to migratory bird species, and recommend appropriate mitigation measures at that time. Although the vast majority of bird species identified in the MIA as occurring in the region are migratory, most of the Master Plan improvements would occur in areas that are substantially distant from the U.S. It is anticipated that implementation of the the MIA recommendation to consider potential impacts to bird habitat within Mexico, during the detailed planning, design, and evaluation of Master Plan improvements, will serve to avoid or reduce impacts to bird species in general. In those cases where impacts to bird species cannot be avoided, the NEPA analysis completed in conjunction with more detailed levels of project consideration by U.S. federal agencies would evaluate whether transboundary effects to migratory birds would occur. Depending on the location of the improvement (i.e., distance from the U.S.), the nature, extent, timing, and duration of habitat disturbance, and the particular species potentially impacted, a transboundary effect may, or may not, occur. The NEPA analysis completed at a site-specific, project-specific level would address the potential for transboundary effects to affected migratory species and recommend mitigation measures if/as appropriate. Potential mitigation options could include, but not be limited to, facility siting or site design modifications to avoid or reduce removal of sensitive habitat, creation or enhancement of other habitat areas to compensate for the loss of existing habitat, and construction activity requirements such as completion of pre-construction bird surveys and limitations on construction activities, particularly during breeding seasons or during migration periods. With the additional NEPA analyses completed at more detailed levels of Master Plan implementation, and the attendant identification of specific mitigation measures, as appropriate, it is anticipated that transboundary effects would be reduced to a level less than significant.

4.4.3 Alternative 2

Biological resources impacts associated with Alternative 2 are the same as described above for Alternative 1.

4.4.4 Alternative 3

Biological resources impacts associated with Alternative 3 are the same as described above for Alternative 1.

4.5 Cultural Resources

4.5.1 No Action

Under the No Action Alternative, there would be no improvements or construction-related activities occurring within the U.S., hence, there would be no impacts to potential cultural resources therein.

4.5.2 Alternative 1

Alternative 1 proposes development of the Alamar WWTP, which includes as an effluent disposal option the construction of a pipeline to connect with the SBLO. The pipeline would extend approximately 1,500 feet (457 m) into to U.S. and excavation for the pipeline would occur using an open trench method. Based on cultural resource investigations completed for the nearby SBIWTP and SBWRP, which did not find any significant archaeological resources in the general area, it is not expected that development of the subject effluent pipeline segment would result in significant impacts to cultural resources. In conjunction with future more-detailed engineering and refinement of the route for the subject pipeline segment, an alignment-specific cultural resources investigation would be completed. The investigation would be conducted in accordance with the requirements of Section 106 of the National Historic Preservation Act, including consultation with the State Historic Preservation Officer as appropriate. Should archaeological resources be located during the survey, they would be evaluated for significance and eligibility to be listed in the National Register of Historic Places, and would be recovered and/or documented as appropriate.

4.5.3 Alternative 2

Cultural resource impacts related to Alternative 2 are the same as described above for Alternative 1.

4.5.4 Alternative 3

Cultural resource impacts related to Alternative 3 are the same as described above for Alternative 1.

4.6 Noise

4.6.1 No Action

Under the No Action alternative, Mexico will build the 4 Japanese credit WWTPs, however, none of these facilities are within close enough proximity for noise levels from the construction or operation of the plants to exceed U.S. standards. In the future, Mexico may undertake further improvements or additions to the existing water supply and sanitation system; however, the likelihood, nature, and location(s) of such improvements are currently unknown. It would be speculative to evaluate the potential impacts of such potential projects.

4.6.2 Alternative 1

With the exception of the Alamar WWTP and the effluent disposal option involving construction of a pipeline to the SBLO, the majority of the infrastructure being proposed for this project is located too far away from the U.S. border to have any impact on noise levels in the U.S.

Construction of the Alamar WWTP would involve a variety of grading and construction equipment. Based on construction equipment mix and activity level assumed to be generally comparable to that of other wastewater treatment plants constructed in the general area, such as the South Bay Water Reclamation Plant in San Diego, construction activity noise levels at 50 feet would be approximately 84 dBA for site clearing, 87 dBA for excavation, 83 dBA for construction, and 82 dBA for finishing (SBWRP). Based on a standard noise drop-off rate of 6 dB per doubling of distance, the highest noise level (87 dBA for excavation activities) would naturally attenuate to 75 dBA – the level recognized by the City of San Diego’s Noise Ordinance as the maximum acceptable level for construction noise in residential areas – at a distance of 200 feet. This noise level would fall well within the limits of Mexico and would not result in a significant noise impact within the U.S. The excavation noise levels described above would also be anticipated to occur in conjunction with construction of the effluent pipeline to the SBLO. While in this case, noise levels in excess of 75 dBA would occur within the U.S. at the western end of the pipeline where it would connect with the SBLO, the nearest residential development in the U.S. would be over 2,000 feet away (i.e., west of the intersection of Monument Road and Dairy Mart Road). The land uses within the U.S. most immediate to the pipeline construction area include industrial (i.e., the SBIWTP and the SBWRP) and undeveloped open space. As such, construction noise associated with the pipeline construction would be less than significant.

Although the proposed project is still in the conceptual phase, typically the only noise concerns from an activated sludge plant are the blowers. In general, noise levels from blowers are not to exceed 85 dBA at 50 feet. Notwithstanding that numerous noise attenuation measures such as shielding, enclosures, and noise baffles can be incorporated into the plant design, such noise levels would naturally attenuate over distance. At the international border located approximately 9842 feet (3 km), the blower noise level would be approximately 40 dBA with no noise attenuation design measures.

Considering the distance from the international border and the fact that most land adjacent to Mexico in this is area is undeveloped, neither construction or operation noise associated with Alternative 1 would result in significant noise impacts within the U.S.

4.6.3 Alternative 2

Noise levels generated from Alternative 2 would be essentially the same as those discussed for Alternative 1. Although the size of the Alamar WWTP under Alternative 2 is smaller than that proposed under Alternative 1 (i.e., 22 mgd / 980 L/s compared to 44 mgd / 1,470 L/s), the construction-related and operations-related noise levels of the two scenarios would not differ in a material way.

4.6.4 Alternative 3

Noise levels generated from Alternative 3 would be essentially the same as those discussed for Alternatives 1 and 2. Similar to Alternative 2, the size of the Alamar WWTP under Alternative 3 is smaller than that proposed under Alternative 1 (i.e., 22 mgd / 980 L/s compared to 44 mgd / 1,470 L/s), however, the construction-related and operations-related noise levels of the two scenarios would not differ in a material way.

4.7 Indirect Impacts

In addition to the direct environmental consequences described above, implementation of the proposed Master Plan could have indirect effects within the U.S.

4.7.1 Production and Transport of Construction Materials

Construction of the proposed desalination plant, new and renovated wastewater treatment plants, and the associated infrastructure such as pump plants and pipelines is likely to require equipment and materials manufactured in, and/or transported from, the U.S. Such activity would have its own array of environmental consequences occurring within the U.S. such as the consumption of natural resources/energy and the generation of traffic, air pollutants, noise, etc. These potential indirect transboundary effects of the proposed action would be substantially dispersed over time and geographic areas, and are not anticipated to be significant.

4.7.2 Growth Accommodated by Master Plan Improvements

Inasmuch as the proposed Master Plan is designed to accommodate the potable water supply and wastewater treatment needs of future growth in the Tijuana-Rosarito area, the realization of that growth would include increased population and associated impacts on the environment. Relative to the transboundary effects of such future growth and development, there could be an increase in travel between Mexico and the U.S. and the potential for air quality and noise impacts to occur in the U.S. Such impacts are not expected to be significant based on the dispersed nature of future growth, and natural/existing conditions such as the predominant wind direction and the sparse nature of uses along the border within the U.S. that serve to reduce the potential for significant transboundary impacts. Moreover, such indirect impacts would not occur as a result of the proposed Master Plan, but rather from the growth that is projected to occur even without the services proposed in the Master Plan. The transboundary impacts that could result from growth if the Master Plan actions are not implemented would be much greater since groundwater resources shared with the U.S. could be over-pumped, and water quality in the ocean and the Tijuana River could be affected by untreated or poorly treated wastewater discharges.

4.7.3 Other Indirect Impacts

In conjunction with construction activities, particularly with respect to construction of the effluent pipeline segment occurring within the U.S., it is possible that indirect impacts to U.S. energy resources such as use of fuels and temporary construction site power may occur. Such impacts would be negligible. Also, the development of the Corridor 2000 would create more impervious areas, although it is difficult to quantify the level of interference to groundwater recharge.

4.8 Mitigation Measures

As described in Sections 4.1 through 4.6 above, transboundary impacts associated with the proposed action are anticipated to be less than significant. No mitigation measures are proposed.

4.9 Cumulative Impacts

CESPT has plans to provide an additional 29.6 mgd (1300 l/s) of water through expansion of the existing Colorado River Tijuana aqueduct. The exact nature, extent, and location of future improvements have not been determined; however, it is likely that there will be grading and construction activities resulting in surface disturbance and temporary noise, dust, equipment exhaust at various locations along the aqueduct corridor. Given the distance of the aqueduct from the U.S. border, generally averaging about 5,000 - 10,000 feet (1524 m - 3048 m), south of the border, it is not anticipated that such activities would result in significant transboundary impacts within the U.S.

The Japanese Credit plants will be built and will start operation by 2005. Impacts of these plants, operational and construction related, have been discussed in the No Action alternative.

Effluent disposal from La Morita and Monte de los Olivos using the SBOO represents a cumulative impact, which has been assessed in the water quality sections of this EA.

It is unknown as to what other, if any, other projects might occur coincident to development of the improvements envisioned in the Master Plan, leading to potential cumulative impacts. At this point in the planning and environmental evaluation process, it would be speculative to attempt an analysis of other cumulative impacts.

Section 5

5.1 Federal Environmental Regulations

While NEPA documents typically include an analysis of a proposed action's relationship to various federal laws and policies that pertain to environmental resources, the nature and location of the currently proposed action, involving a master plan for water and wastewater systems improvements in Mexico, substantially limit, if not preclude, the applicability of such regulations. The following describes various environmental laws, referred to by the EPA as "cross-cutters", which typically apply to all federal programs. In the case of the currently proposed action, the emphasis of the following analysis is on the applicability of federal environmental regulations as related to impacts occurring within the U.S.

Clean Water Act – The Federal Water Pollution Control Act Amendments of 1972 were amended in 1977 to become what is commonly known as the Clean Water Act (CWA). The CWA established the basic structure for regulating discharges of pollutants into the waters of the U.S. The CWA is administered through the EPA and employs a variety of regulatory and nonregulatory tools to limit, reduce, and, where possible, eliminate pollutant discharges into waterways. The CWA regulation of pollutant discharges traditionally focused on "point source" facilities such as municipal sewage plants and industrial facilities, but of late, has expanded to provide increasing emphasis on "area sources" such as stormwater runoff within watershed areas. Additionally, the CWA, specifically Section 404, regulates the placement of dredged or fill materials into Waters of the U.S. Relative to the currently proposed action, the provisions of the CWA would apply primarily to the proposed discharge of treated effluent from the SBOO. The potential impacts related to the subject discharge are addressed above in Section 4.2. Another relevant aspect of the proposed action pertains to potential erosion and sedimentation impacts during construction activities occurring within the U.S. for the connection of the effluent line to the SBLO. Those impacts are also addressed above in Section 4.2. Relative to Section 404 of the CWA, the proposed action does not include or result in the placement of dredged or fill material into Waters of the U.S., as indicated above in Section 4.4.

Clean Air Act – The Clean Air Act (CAA) was set forth with the goal to protect and enhance air quality in order to promote the public health and welfare. The CAA is administered through the USEPA. To meet the goal of the CAA, the USEPA has set National Ambient Air Quality Standards (NAAQS) for various air pollutants referred to as "criteria pollutants." States are required to develop plans and programs within State Implementation Plans (SIPs), subject to review and approval by the USEPA, indicating if, how, and when the ambient air quality within each respective state will attain the NAAQS. Federal actions must conform with the applicable SIP, as defined by the General Conformity Rule (40 CFR 93.150 *et* seq) which covers direct and indirect emissions of criteria pollutants, or their precursors, that are caused or otherwise authorized by a federal action, are reasonably foreseeable and can practicably be controlled by the federal agency responsible for the action. Projects and activities occurring outside of the U.S., such as the currently proposed action, are not included in a SIP and their associated emissions are typically not within the control of U.S. federal agencies. Although construction activities associated with the currently proposed action that will occur within the U.S., specifically construction of the effluent pipeline connection to the SBLO, may be considered within the context of the General Conformity Rule, the air pollutant emissions associated with the subject activities would be well below *de minimus* levels pertaining to applicability of the General Conformity Rule.

Endangered Species Act – With respect to Cross-Cutters, the purpose of the Endangered Species Act (ESA) is to ensure that federal agencies and departments use their authorities to protect and conserve federally listed endangered and threatened species. The ESA is administered through the U.S. Fish and Wildlife Service (FWS). Section 7 of the ESA requires federal agencies to consult with FWS on federal actions/activities that are “likely to jeopardize the continued existence of any endangered species or threatened species, or result in the destruction or adverse modification of critical habitat of such species. With respect to the currently proposed action, federally listed species are known to occur within the Tijuana River Valley/Estuary. Two species with habitat nearest to the proposed effluent pipeline route connecting to the SBLO include the least Bell’s vireo and the California gnatcatcher, both with habitat being approximately 2,500 feet (762 m) west of the pipeline route. No significant direct or indirect impacts to these species or their habitat are expected to occur from the proposed action. Although both species are considered to be sensitive to noise levels greater than 60 dBA during their respective breeding seasons, noise levels associated with pipeline construction activities ranging up to 87 dBA at 50 feet (15 m) would naturally attenuate (due to geometric spreading of sound) to approximately 53 dBA at 2,500 feet (762 m).

National Historic Preservation Act – The National Historic Preservation Act (NHPA), as amended, directs federal agencies to integrate historic preservation into all activities that either directly or indirectly involve land use decisions. This is to ensure federal leadership in the preservation of prehistoric and historic resources of the United States. The NHPA is administered by the U.S. Department of the Interior, National Park Service and the Advisory Council on Historic Preservation, as well as through State Historic Preservation Officers in each state. With respect to the currently proposed action, there are no U.S. prehistoric or historic resources known to occur at, or near, project construction areas.

Archaeological and Historic Preservation Act – The Archaeological and Historic Preservation Act (AHPA), as amended, provides for the preservation of cultural resources that may be damaged by federal or federally authorized construction activities. The U.S. Secretary of the Interior, National Park Service's Departmental Consulting Archaeologist, administers the AHPA. The portions of the AHPA that may apply to federal agency projects are Section 4(a) and Section 7(a). Section 4(a) requires that the Secretary of the Interior (i.e., Departmental Consulting Archaeologist) be notified when unanticipated archaeological materials are discovered during construction of a federal undertaking. Section 7(a) limits the amount of funds expended for archaeological data recovery. Relative to the currently proposed action, no significant archaeological finds have occurred in the general vicinity of the proposed effluent pipeline route connecting to the SBLO; however, in the event that archaeological materials are discovered during excavation along the subject route, the provisions of Section 4(a) and Section 7(a) of the AHPA would apply.

Wild and Scenic Rivers Act – The purpose of the Wild and Scenic Rivers Act, as administered by the U.S. Department of the Interior, is to preserve the free-flowing state of rivers that are listed, or are under study for listing, in the National Wild and Scenic Rivers System. Relative to the currently proposed action, there are no such rivers in the project vicinity.

Fish and Wildlife Coordination Act - The Fish and Wildlife Coordination Act, as administered through the U.S. Department of the Interior, was enacted to protect fish and wildlife when federal actions result in the control or modification of a natural stream or body of water. The currently proposed action does not include or involve any such control or modification of a natural stream or body of water.

Coastal Zone Management Act – The Coastal Zone Management Act (CZMA) requires that federal agencies be consistent with the enforceable policies of state coastal zone management programs when conducting or supporting activities that affect a coastal zone. The CZMA is administered by the U.S. Department of Commerce. Relative to the currently proposed action, construction of the effluent pipeline between the international border and the SBLO would occur within the coastal zone. The Coastal Zone Management Program for the Tijuana River Valley, within which the subject pipeline segment is located, is governed by the California Coastal Act Policies and Plan, Local Coastal Program, and Tijuana River National Estuarine Sanctuary Management Plan. The Tijuana River Valley Plan and Local Coastal Program Addendum, administered by the City of San Diego, provides land use policies and goals for the portions of the Tijuana River Valley located within the City of San Diego and coastal zone. The subject community plan and local coastal plan designates the proposed pipeline segment area, including areas to the east and west, for wastewater treatment facilities. The proposed action is consistent with that plan land use designation.

Coastal Barrier Resources Act – The Coastal Barrier Resources Act (CBRA) , administered through the FWS, serves to protect ecologically sensitive coastal barriers designated along the coasts of the U.S.. There are no designated coastal barriers along the southern California coast.

The Wilderness Act – The Wilderness Act, administered by the U.S. Department of the Interior, establishes a system of National Wilderness areas and a policy for protecting and managing the system. There are no designated National Wilderness areas in the vicinity of the effluent pipeline segment proposed within the U.S..

Farmland Protection Policy Act - The purpose of the Farmland Protection Policy Act (FFPA) is to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses. The FFPA is administered by the U.S. Department of Agriculture. While agricultural uses had historically occurred in the vicinity of the site proposed for the effluent pipeline segment within the U.S., much of the general area is now developed, including with the SBIWTP and the SBWRP, and agricultural uses no longer occur at, or near, the proposed pipeline segment area.

Executive Order 11990 Protection of Wetlands – The purpose of Executive Order 11990 is to "minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands." There are no wetlands occurring at, or along, the Alamar WWTP effluent pipeline segment proposed within the U.S..

Executive Order 11988 Floodplain Management – Executive Order 11988 requires federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. Although the effluent pipeline segment proposed within the U.S. occurs within the historic floodplain of the Tijuana River, improvements made to the south levee of the Tijuana River in conjunction with construction with the SBIWTP removed the subject area from the 100-year flood zone. As such, implementation of the proposed action would not conflict with Executive Order 11988.

Executive Order 12989 Environmental Justice – Executive Order 12989 requires that federal actions be evaluated to determine if they would result in a disproportionately high and adverse human health or environmental effects on minority or low-income populations. The area of the effluent pipeline segment proposed within the U.S. occurs within Census Tract 100.09, which is predominantly Hispanic with average household incomes substantially less than the median San Diego region household income. Implementation of the proposed action would not, however, result in any high and adverse health or environmental effects on any nearby populations. The impacts of the project are limited to short-term, localized impacts associated with pipeline construction. The subject pipeline segment construction area is bordered to the north by the Tijuana River, immediately to the east by the SBIWTP, and more distant to the west by the SBWRP. The nearest residence is located over 2,000 feet (610 m) away.

Section 6
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